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BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

8

VOLUME VII

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JUNE 1940

Vol. VII, No. 8 (Not for publication) August 1, 1940

ADMINISTRATION

New Plant Quarantine Building, Hoboken, N. J.

The plant quarantine building at Hoboken, N. J., which had been under construction since the fall of 1938, was taken over on June 27 and occupied on June 28. The building houses the special-permit inspection and treatment work of the Division of Foreign Plant Quarantines, with George G. Becker in charge, and the insect-parasite work of the Division of Foreign Parasite Introduction, with T. R. Gardner in charge. It occupies the site of the old Captain Mueller house on the east side of River Street between piers 2 and 3 of the old North German Lloyd Steamship Company, which was taken over by the United States during the World War. The site of the building was allocated to the Department of Agriculture by the U. S. Maritime Commission, largely through the efforts of Bernard Connor of this Bureau. The Bureau's part in the preparation of the plans and specifications for the building, the supervision of construction, and the numerous details associated with its erection and construction have been handled by Lon A. Hawkins, leader of the Division of Control Investigations.

The building is constructed of reinforced concrete with tile walls and buff brick on the outside. It is trimmed with four bands of brown glazed terra cotta with ivory terra cotta coping. Window sash are steel, doors are metal clad, floors are cement with lineoleum finish or quarry tile, and the building is practically fire-proof. It is 144 by 52½ feet and has four stories, with basement, boiler room, and penthouse. Three 50-horse power high-pressure oil-burning steam boilers are installed in the basement, the floor of which is approximately 5 feet below low tide. The oil tank has a capacity of approximately 10,000 gallons of fuel oil and is located beneath the first floor at the south end of the building.

The first floor comprises shipping and receiving rooms and has approximately 3,200 square feet of floor space for the handling of shipments. In addition two cold-storage rooms with approximately 550 square feet of floor space are provided on this floor, together with a vacuum fumigation tube of 1,000 cubic-feet capacity, a two-car garage, a transformer room, an electrical room, a machine room containing two 20-ton and one 10-ton Freon compressors and two large two-stage vacuum pumps with accessories. The lobby on the first floor is finished in buff terra cotta and marble, with aluminum trim and aluminum and monel metal doors.

The second floor is given over to inspection and treating rooms, there being one inspection room 107 by 18 feet, and another 30 by 32 feet. A fumigation room 30 by 32 feet contains five steam-jacketed vacuum-fumigation tubes and four atmospheric-fumigation chambers. A heat-treating room is equipped with four hot-water treating tanks, two large autoclaves for high-pressure steam sterilization, a large steam drier, and two large chambers for treatment with moist heat or for drying. The finish of the rooms on this floor is ivory terra cotta walls with buff quarry tile floors. The large inspection room is air conditioned.

The third floor contains offices and laboratories and comprises 13 rooms fitted up either for office or laboratory work. A dark room and photographic laboratory are included.

The fourth floor is equipped for insect-parasite work and consists of 4 office rooms and a work shop, which are not air conditioned, 12 insectaries, a corridor, and 2 parasite-handling rooms, which are air conditioned, with a separate installation for accurate regulation of the temperature and humidity of each room. The air-conditioned rooms are provided with tight triple-glazed windows. Four cold-storage rooms are also provided in this section.

FRUIT INSECT INVESTIGATIONS

Ten years of trapping for dried-fruit beetle.--Records for 10 years' trapping of Carpophilus hemipterus (L.), to study the conditions which influence the size of the overwintering and spring populations, have been completed this spring by D. F. Barnes, of the Fresno, Calif., laboratory. The trapping consisted of operating 3 traps, baited with fermenting dried cull peaches and yeast, in each of 4 locations during the 10-year period. All locations were within a 15-mile radius of Fresno. With the exception of 1933, a late season, traps were placed in the field late in February. Beginning with the first week in March, collections and examinations of the catches were made at weekly intervals for a 12-week period. This spring, after a dry November and December and a warm, wet January and February, 8,804 dried-fruit beetles were taken in 994 trap-days, or 8.9 per trap per day. During the 10 years of spring trapping, 112,187 individuals have been recorded in 9,789 trap-days, or 11.5 per trap per day. Observations in previous years have indicated that moisture in the soil when the larvae are entering it for hibernation assists them in establishing themselves. On the other hand, adults, which do not hibernate but merely cease activity during cold spells, are assisted in overwintering by warm, dry weather. Apparently dry weather and soil in the late fall, followed by wet conditions in midwinter, reduced the 1940 population. The following table summarizes the observations of the 10-year period.

Collection dates	Dried fruit beetles taken per trap per day in--									
	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
March:										
2-4----------	0.8	0.3	--	23.0	0	14.3	0.7	--	3.6	2.4
9-11---------	1.2	.7	--	18.6	0.01	11.8	.7	0.2	3.3	8.2
16-18---------	1.2	.9	---	13.9	.5	9.3	.6	.3	10.2	7.4
23-25---------	2.1	.8	--	11.3	.5	7.7	.5	1.3	10.0	7.6
March 28-April 1	2.9	.8	0.4	10.7	.9	6.6	.5	--	8.7	6.3
April:										
4-8----------	4.5	.9	1.0	15.9	1.2	6.4	.5	2.8	8.7	6.7
11-15---------	4.3	1.1	.9	21.4	1.5	8.2	.9	2.8	10.5	7.6
18-22---------	6.3	1.1	1.2	24.1	1.6	8.5	1.1	3.5	11.0	7.6
25-29---------	6.7	1.1	2.1	23.9	1.6	8.7	1.1	3.8	10.8	7.1
May:										
2-6----------	10.0	1.2	2.4	25.3	1.8	10.3	1.2	2.7	10.8	8.0
9-13---------	12.9	1.7	4.6	30.3	2.1	13.4	1.4	3.4	10.9	8.8
16-20---------	20.3	1.8	9.1	31.4	2.5	17.0	1.5	4.8	11.4	8.9
23-----------	--	--	13.0	--	--	--	--	--	--	--
30-----------	--	--	18.5	--	--	--	--	--	--	--

Survey on blueberry mite.--For several years complaints have been received of serious injury to cultivated blueberries in North Carolina by a species of mite. At first the identity of the mite was not known, but it was described in 1939 by H. H. Keifer, of the California Department of Agriculture, as *Eriophyes vaccinii* (see Calif. Dept. Agr. Bul., v. XXVIII, No. 5, p. 229. 1939). By courtesy of the California State Department of Agriculture, Mr. Keifer has recently spent several weeks in a survey of a number of Eastern areas, in order to determine the status of this mite. Although the mite was first known to occur only in North Carolina, Mr. Keifer found it in cultivated plantings in New Jersey and Georgia, and in wild blueberries at many points from southwestern Connecticut to the vicinity of Gulfport, Miss. Most of the surveys were made along the coastal plain, although one trip into the Blue Ridge Mountains revealed the presence of this mite near Sperryville, Va. The North Carolina Experiment Station is now carrying on investigations to develop methods of controlling this pest.

More on dichloroethyl ether for control of plum curculio.--Oliver I. Snapp reports that the results of laboratory experiments just completed at the peach-insect laboratory at Fort Valley, Ga., show that, even when applied to very damp soils, dichloroethyl ether at the rate of 1 fluid ounce in 1 gallon, using 1/6 gallon or 7 fluid ounces of water per square yard of soil, is very effective against plum curculio pupae. Not a single individual reached the adult stage where the most dilute spray was used against 750 plum curculio pupae. Only 1.2 and 1.1 percent, respectively, reached the adult stage where

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the 2 most concentrated sprays were used in each experiment against 750 plum curculio pupae. One-third fluid ounce of dichloroethyl ether in 1/6 gallon of water per square yard of soil was not so effective against plum curculio larvae as 1/3 fluid ounce in 1 gallon of water when tested on thoroughly wet soil. The adult emergence from 750 larvae in each of these experiments was 12.5 and 2.5 percent, respectively. From the soil under 4 caged peach trees, each artificially infested with 350 plum curculio larvae in addition to those naturally present, only 1 plum curculio adult emerged following 1 treatment with dichloroethyl ether at the rate of 1 fluid ounce in 1/6 gallon of water (1/6 gallon of 4.5 percent emulsion of dichloroethyl ether) per square yard of soil. This individual was weak, and died 4 days after emergence.

MEXICAN FRUITFLY CONTROL

Fruitfly damage below normal.--The number of fruitflies trapped in Texas in June exceeded expectations somewhat. Fruitflies totaling 1,126 were submitted for identification from all parts of the regulated area early in the month, but there was a drastic reduction in the number of adults taken in the latter half of June. Only a very few of the female flies trapped were gravid and almost all flies appeared to be newly emerged. Reports from all the districts indicate that the new citrus crop is developing satisfactorily and that less than the normal amount of insect damage is present. Estimates on next season's fruit production foreshadow a noticeable reduction in the grapefruit production for the coming season.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Numbers of grasshopper egg pods required to produce outbreaks differ for various types of habitat.--C. C. Wilson, Sacramento, Calif., reports that an egg survey conducted in foothill grazing land in the lower San Joaquin Valley in 1939 averaged 0.3 egg pod per square foot, which was sufficient to produce an outbreak of grasshoppers in Kern County, with attendant migration into cultivated crops, in 1940; whereas in the coastal habitat of the economic species of grasshoppers, in San Luis Obispo County, an average of 1.3 egg pods per square foot was recorded in 1939, with no appreciable migration or noticeable damage to the range forage in 1940. The marked difference in the numbers of egg pods required to produce an outbreak in the above-mentioned areas is thought to be due to the size of the egg beds and the availability of food. In the lower San Joaquin Valley the egg beds were probably more widespread and the density of vegetation averaged about 60 percent, whereas in San Luis Obispo County the egg beds were restricted to relatively small areas and the density of vegetation approached 100 percent.

Modification of resistance by environmental factors in hessian fly control.--W. B. Cartwright, Lafayette, Ind., says that extreme caution must be observed in interpreting field and greenhouse tests on wheats resistant to the hessian fly, owing to the modification of resistance by environmental factors. Illinois No. 1 W38, a vulgare resistant wheat, approaches a plant infestation of susceptible varieties when grown in the greenhouse with high temperatures, together with adverse light and other unnatural factors. Such modification, however, has not been expressed in the Durum F.P.I. 94587, or in some of its winter hybrids.

Effect of boron on alfalfa attacked by potato leaf hopper.--F. W. Poos, Arlington Farm, Va., reports that experiments on the effect on the potato leafhopper of varying amounts of boron in the nutrient solutions supplied to vegetatively produced alfalfa plants showed no significant differences in the number of nymphs produced on the various lots. Plants receiving no boron showed diseaselike boron-deficiency symptoms and such symptoms seemed to be aggravated by the presence of potato leafhoppers on such plants. Typical symptoms of potato leafhopper injury occurred coincidental on such plants. Field observations on small plots in south-central Virginia indicate that 10 pounds of borax per acre, applied in fall or spring, prevents much yellowing of alfalfa not caused by the potato leafhopper.

Effectiveness of poison bait for grasshoppers.--O. L. Barnes, of the Tempe, Ariz., laboratory, in discussing his observations on the intensive study area for grasshoppers, at Yuma, Ariz., during the spring of 1940, says: "Standard poisoned-bran bait was applied to the entire acreage in the area between April 1 and May 13. In some fields with the heavier infestations two, and sometimes three, general applications were made. A mechanical spreader of the type recommended by the grasshopper control unit of the Bureau was used, and the entire surface area of fields was covered. Results of poisoning were good, as evidenced by reduction in populations of living hoppers and the presence of dead hoppers after bait applications. The effectiveness of the baiting operations may be examined in the light of comparative egg, nymphal, and adult populations in alfalfa fields during the winter of 1939-40 and the spring of 1940. This could call for a No. 4.2, or 'severe' infestation rating. A survey on March 27-28 at 6 representative alfalfa locations showed an average nymphal population of 59.3 hoppers per square yard. Such a nymphal population requires an infestation rating of 4.5, or 'severe.' The actual spring-peak population had not been reached by March 28, but owing to poisoning and pasturing at some locations, the population crest had been passed before the next observation visit on April 9-10. The actual peak, had the hoppers been unmolested, would have justified a No. 5, 'very severe' infestation rating. A fence-row and field-margin egg population of 3.82 pods per square foot the winter before was ample to raise the general infestation rating in the vicinity of alfalfa fields to No. 5, 'very severe.' These No. 5 winter egg and spring nymphal ratings were followed by a spring adult rating of No. 1, based on an average population of 2 hoppers per square yard May 22, when most of the living hoppers had reached the adult stage. This reduction in the grasshopper status from a 'very severe' to a 'normal' rating was due in the greater part, it is believed, to thorough and timely applications of poisoned bait while most of the hoppers were in the nymphal stage."

Substitute for Chinese-gallotannin in dust preparations of dual-fixed nicotine.--C. H. Batchelder, New Haven, Conn., in discussing the results of field experiments with insecticidal preparations in dust form for control of the European corn borer in 1939, reports as follows relative to substitutes for Chinese gallotannin: "The results of the tests with experimental preparations of nicotine indicated: (1) Either the quebracho or myrobalans types of dual-fixed nicotine may be used without injury to sweet corn. (2) Myrobalans tannin, as prepared and used under the conditions of this experiment, was a satisfactory substitute for Chinese gallotannin in dual-fixed nicotine, displaying in this experiment very good promise of being equally useful under various weather conditions. (3) Quebracho of the low nontannin type was a satisfactory substitute for Chinese gallotannin in dual-fixed nicotine, as used in this experiment during a period of drought. Its performance gave some indication that the adhesiveness of this material should be increased if it is to be used where moderate rainfall is a frequent occurrence."

Synthetic media for rearing European corn borer larvae.--In general, the results of recent investigations being conducted by G. T. Bottger, Toledo, Ohio, relating to the development of synthetic media for rearing corn borer larvae, indicate the most satisfactory were those formulated in approximately the following percentages: Inert carrier (cellulose 3.6, agar 1.8), 5.4; protein (casein) 3.6; reducing sugar, 2.4; invert sugar, 1.3; mineral salts, 0.6; fat, 1.3; water, 85.4. As many as 36 percent of larvae nourished entirely on a purely synthetic food survived to larval maturity and attained normal or near normal weights during a 30- to 40-day test period and, of those that survived, from 20 to 30 percent pupated in some of the groups. With further research directed toward the amino-acid relationship to corn borer nutrition, it is probable that both the growth rate and size of synthetically nourished larvae and resultant moths can be controlled at will.

Occurrence of multiple-generation European corn borers in the Lake States.--A. M. Vance, Toledo, reports that progeny rearings of European corn borer in the laboratory from field-collected parent stock in the Lake States area, indicate that, at the present time, the second-generation tendency is very pronounced in the southeastern part of the infested part of Indiana, in Wayne and Union Counties, less important in the more northern counties of Allen, Ind., and Allen, Ohio, and negligible in the Michigan counties of Calhoun, Washtenaw, and Tuscola. A little evidence of the second-generation character was found in Ashtabula County, in the extreme northeastern corner of Ohio.

Clean-up for European corn borer control near Boston, Mass.--E. W. Beck, Waltham, Mass., states that the spring debris survey in the Waltham study area indicates an improvement in clean-up and destruction of overwintering borers in that locality, as shown by reductions in host-plant material and borers from 1938 to 1939 of 91 and 95 percent, respectively, as compared with similar reductions from 1939 to 1940 of 97 and 99 percent, respectively. This may be a reflection of the heavy losses suffered by the growers in 1939, resulting in greater emphasis on clean-up measures..

European corn borer parasites in Eastern States at end of 1939.--C. A. Clark, Moorestown, N. J., reports that investigations of the field status of parasites of the European corn borer were conducted at seven locations in the Eastern States area at the close of 1939, the results from six of these survey districts being summarized as follows: Inareolata punctoria Roman, an introduced ichneumonid parasite of corn borer larvae, averaged 10.6-percent parasitization of the borer, with a maximum of 23.9 percent in the Middlesex, Mass., district. At the Hartford, Conn., district, this parasite averaged 8.7-percent parasitization of the borer in the 133 square miles surveyed, with an average of 14.1 percent in the central 7.1 square miles nearest the point of longest establishment. The maximum recorded parasitization by this parasite in the Hartford district was 34.8 percent. No conclusions could be reached as to directional dispersion, but that dispersion of the parasite had passed beyond the extended limits of the surveyed area was evident from the data obtained. I. punctoria was found to be well established at the more recent liberation point at Atlantic, N. J., where parasitization by it had reached 2.2 percent. It was not recovered from a small collection of host larvae made at Brick, in Ocean County, N. J., but was recovered, showing initial establishment and maintenance, at Burlington, N. J., where it was released in 1938. This parasite was not recovered on the Eastern Shore of Virginia. Lydella grisescens R. D., an introduced tachinid parasite of corn borer larvae, was recovered in somewhat larger numbers than in 1938 from the collections made in Middlesex County, Mass., but was still comparatively scarce there. This dipterous parasite was recovered in nine townships within the Hartford, Conn., district. A parasitization of 18.9 percent was recorded for one collection from this district. L. grisescens has continued to disperse, particularly in a westward and northwesterly direction, and may be found over 6 miles from the point of release in the center of the Hartford district. This tachinid was found to be well established at Atlantic, Monmouth County, and Brick, Ocean County, N. J. At Burlington, N. J., it was found to be well established and spreading rapidly from the point where a small number of adults were first released in 1939. In Virginia L. grisescens had not increased in 1939 but continued to be the only exotic parasite of the borer at work there. The average parasitization of the corn borer by this parasite was 7.2 percent at Lee and 1.4 percent at Franktown, both on the Eastern Shore. Chelonus annulipes Wesm., an imported egg-larval parasite of the borer, was found to be widely established in the Hartford, Conn., district following releases in the spring of 1939. Apparently widespread initial establishment was obtained here by proper synchronization of adult parasite releases with host-egg abundance. This braconid parasite of the borer was also recovered at the point of recent release in the Burlington district of New Jersey. It was not recovered in Virginia, where it was initially established in 1937. The native parasites Bassus agilis Cress. and Labrorychus prismaticus Nort. were again recovered, the former at the Middlesex, Mass., and Hartford, Conn., districts, and the latter species at Middlesex only. Neither species showed any indication of increasing parasitization of the borer and both remain unimportant as parasites of the overwintering generation.

Domestic collection of European corn borer parasites.--Mr. Clark also states that the supply of the polyembryonic parasite Macrocentrus gifuensis Ashm. for colonization in 1940 was obtained from host larvae collected in the fall of 1939 in southeastern Massachusetts and reared out at the Moorestown, N. J., corn borer laboratory last spring. A total of 20,068 larvae, each isolated in an individual shell vial, were removed from cold storage on May 22 and placed under developmental conditions of 75° F. and 80 percent relative humidity. When the M. gifuensis larvae issued from the hosts and formed cocoons these were removed from the incubator to a parasite-emergence chamber in an outside insectary. No less than 4,215, or 21 percent, of the host larvae placed in the incubator gave M. gifuensis. From these 4,215 cocoon masses, supplemented with an additional 120 masses from parasite field-status collections, 78,815 M. gifuensis adults were reared, or an average of 18.2 adults per cocoon cluster. About 2,000 Chelonus annulipes, 1,600 Lydella grisescens, and 500 Inareolata punctoria were also reared from these borers.

European corn borer parasites in Lake States at end of 1939.--W. G. Bradley, Toledo, Ohio, reports as follows on surveys conducted during October 1939 to determine the status of exotic and native parasites of the European corn borer in selected districts in the Lake States area infested by the European corn borer: "Three species of exotic parasites were reared from 161 sample collections comprising 14,112 larvae. This material was held in cold storage during the winter and reared in a developmental environment in March and April 1940. One of the species, an ectophagous chalcid, *Eulophus viridulus* Thoms., which had been recovered for the first time in 1938 following its release in 1931 and 1932, was taken at a number of new localities including points where observations had been made annually since the year of release. It is evident that this parasite became established and remained on a maintenance basis for a number of years in concentrations too low to permit recovery by the means utilized. That the slow increase in the abundance of the parasite has been accompanied by considerable dispersion is evidenced by its recovery at a point 19 miles from the nearest release point. *Lydella stabulans* var. *grisescens* R. D. was the most abundant parasite recovered but, contrary to results in previous years, no increase in parasitization was noted at any point. At 2 of the oldest release points where parasite populations had shown yearly increases to a comparatively high level, the parasitization remained the same in 1939 as in 1938. It is probable that equilibrium of the parasite with its host was attained in 1938 in the immediate vicinity of the release points. In areas adjacent to marshland *L. grisescens* continued at a high level, the borers in many of the collections showing a parasitization of over 50 percent. *Chelonus annulipes* Wesm., an egg-larval parasite, showed a considerable increase in abundance at a point near Toledo, Ohio, where it had been released in 1938 to test its reactions in a locality where the proportion of multiple-generation hosts was comparatively high. The parasitization in one collection was 12.6 percent. Three native parasites, *Zenillia caesar* Ald., *Panzeria penitalis* Coq., and *Labrorychus prismaticus* Nort., were obtained in small numbers in the fall survey."

Laboratory breeding of Chelonus annulipes.--W. G. Bradley, Toledo, Ohio, summarizes as follows the current laboratory breeding program for *Chelonus annulipes* Wesm., to provide adults for colonization of this European corn borer parasite, principally in the Hudson River Valley, and utilizing *Ephestia kuehniella* Zell. for the host breeding stock: "From the *E. kuehniella* eggs, parasitized principally in March by an average of 14 females per day ovipositing for 18 days, there emerged in March and April, 5,783 adults. Females of this generation were used to parasitize host eggs for the production of material to be released chiefly during the period June 3-10 in the Hudson River Valley, N. Y. Oviposition started on April 10 and by May 1, there had been exposed for parasitization 7,590 egg clusters (eggs stuck to cardboard 100 per cluster). This was an average of 345 per day. The maximum number utilized on any 1 day was 711. Emergence of adults from this material started on May 17 and by June 18 over 125,000 adults had been produced. At the time the parasitized material was discarded the adults were still emerging at the rate of 3,000 per day; therefore it is probable that over 150,000 adults would have been obtained."

JAPANESE BEETLE CONTROL

Local Japanese beetle campaigns.--J. L. Prouty, of the Springfield, Mass., park department reported on June 30 that 200 Japanese beetle traps had been set by his department. A total of 1,600 traps will be placed in Springfield by Mr. Prouty's organization. John A. Pierson, superintendent of the Union County, N. J., Park Commission, announced that he had obtained 250 beetle traps for distribution throughout the county's park system. Beetle traps were leased by the City Forester of Baltimore, Md., for 15 cents each for 2 years, and were supplied at any of the city parks. The first 1,000 individuals leasing traps were given a bonus of a small package containing spore dust of the milky disease attacking Japanese beetle grubs. Directions were provided for spreading this dust on lawns.

Airplane inspection.--Inspection of planes to prevent spread of the Japanese beetle by aircraft was inaugurated at the Washington, D. C., Airport on June 26. Ten minutes before the departure of each passenger ship destined to a point outside the regulated area, a thorough inspection is made of the pilot's cockpit, forward baggage compartment, passengers' cabin, and rear baggage compartment. After this inspection, and when no loading of passengers or freight is taking place, all doors and openings are kept closed to prevent beetles from flying in. All baggage and mail bags are watched as they are put on each ship, and any beetles found on them are removed. Passengers entering the plane just prior to departure are watched closely for beetles which may be clinging to their garments. In the course of this inspection, 38 beetles were removed from June 26 to 30. Most of these were on mail bags and passengers or in the cockpits of the various planes.

Refrigerator-car inspection and certification for Japanese beetle.--Fumigation of empty refrigerator cars with HCN and loaded cars with methyl bromide began in June. Operations started at the Edge Moor, Del., yards on June 13, at Baltimore on June 21, Philadelphia on June 22, and Trenton on June 27. Owing to delayed emergence of adults in the New York City area it was possible there to forego fumigation until after June 30. Fumigation procedures this year remain the same, with the exception of the HCN fumigation of empties by the United Fruit Company. This year the "splash method" was approved. This permits the 3 ounces of liquid HCN to be measured and splashed through the bunker door against each end of the car. This eliminates the necessity for pans in the bunkers, thus saving much time and inconvenience. The fumigation of loaded cars was unchanged. As the railroad still had a large supply of cylinders on hand they continued to use the 15-pound applicators. Fifty-four carloads of cabbage were fumigated with methyl bromide at Cape Charles, Va. Ordinarily the cabbage crop in that area is harvested and shipped before the farm products quarantine becomes effective.

Early Japanese beetle emergence.--The earliest reports of emergence of adults came from the Norfolk, Va., field office, where 8 beetles were trapped on June 5. Subsequently beetles were observed in Cape Charles, Va., on June 8; Lancaster, Pa., on June 12; and Sewell, N. J., on June 17. Beetles did not appear at Bloomfield, N. J., until June 30. Beetles appeared to be numerous over the entire Norfolk area. First-record finds were reported in June on several classified establishments. Toward the end of June heavy infestations were noted in the Baltimore area. No beetles had been observed by June 30 along the Delaware River and in nearby public squares in Philadelphia.

Packing houses screened against beetles.--Several packing houses on the "DelMarVa" Peninsula started screening early in June and it appeared that there would be practically 100-percent screening of packing houses in that area. Beetle-proofing of the packing houses will eliminate all possibility of reinfestation after the products have been inspected. Farm scouts operating from the Dover, Del., and Salisbury, Md., offices had a much larger group of farms to scout this season. Products from uninfested farms are not subject to the same inspection at the packing houses that is given products from farms on which beetles have been found.

Long Island estates treat plantings prior to removal.--One Long Island estate applied lead arsenate to soil around 400 trees and shrubs, including considerable boxwood. These plants are to be trucked to a point outside the regulated area in Virginia. Another estate at Southampton treated with lead arsenate a hundred or more large, old potted hydrangeas, bays, fig trees, and oleanders. These have a high sentimental value. Operations involved in their crating and transportation to a point outside the regulated area will cost about $1,000.

Japanese beetle scouting.--Scouting crews were started in June in the southern part of the regulated area. On June 17 two crews started activities in the Richmond, Va., area, and one crew began work in the Alexandria and Fredericksburg, Va., section. Eleven temporary inspectors were added to the force on the Eastern Shores of Maryland and Virginia to take care of the nursery and greenhouse scouting work.

Modification of methyl bromide fumigation requirements.--Another modification of the methyl bromide fumigation instructions, effective June 4, reduced the dosage of fumigant required per refrigerator car from 5 to 4 pounds when the temperature is 80° F. This will reduce the cost of fumigation and eliminate some of the hazards in the fumigation of certain fruits and vegetables. The treatment at the reduced dosage is approved for white potatoes, sweetpotatoes, onions, tomatoes, snap beans, lima beans, sweet corn, cabbage, carrots, beets, apples, and peaches. The reduced dosage at the higher temperature is also authorized for the fumigation of these commodities in approved fumigation chambers.

Preliminary seasonal activities in New York City area.--Of 266 miscellaneous calls made by the New York City inspection force during the month, most of them were for the purpose of acquainting shippers, brokers, and produce dealers with the Japanese beetle certification requirements for fruits and vegetables moving to nonregulated area via refrigerator car or motortruck. This is the first season that New York City and vicinity have been included in the heavily infested area.

Summer scouting for Dutch elm disease started.--Systematic scouting activities started on June 17 in all counties in the New Jersey work area, except in the southernmost counties of Burlington and Ocean. All qualified men except a minimum number of foremen and climbers needed to keep W. P. A. laborers going on elm-sanitation work, were assigned to scouting. Some 300 men, approximately half of the New Jersey field force, were thus transferred. Scouting in June involved systematic foot scouting of approximately 1,800 square miles, or a 50-percent representative sample of the work area. Advance survey scouting was performed in the remainder of the work area and over 2,000 square miles were covered the last week in June. No extensive wilting was in evidence anywhere in New Jersey. Similar scouting activities started on the same date in the New York area above the New York City line, 468 W. P. A. scouts being assigned to the State. All scouting for bark-beetle infestation or for elms subject to beetle attack was discontinued in favor of summer foliage scouting. A few crews in each county were kept to clean up all burning of accumulated wood piles and the removal of confirmations. Whenever possible, bark-beetle infested trees will be tagged during the regular scouting program. Scouts in New York reported at the end of June that a large number of elms showed sparse foliage. Close examination showed that the leaves were small and many of them just breaking through. This is believed to be due to extreme lack of moisture in 1939. Many of these trees, if attacked by elm bark beetles this summer, might not survive another year. County supervisors in New York reported on June 29 that few wilted trees had been found in the work area of that State, the first time that such a situation had been reported at the end of June since the beginning of the Dutch elm disease eradication work in 1933. The earliest typical wilt in New York was found in the town of Oyster Bay, on Long Island. Two trees within 10 feet of one another were involved. Additional trees were found wilting on a property where 14 trees were confirmed in 1939. In Nassau County, 6 specimens were collected, all within 25 feet of 1939 confirmations. All 6 trees seemed to be infected from root grafts, as suckers near the base of the trees showed the first wilt.

Foliage symptoms delayed.--Rain and cool weather delayed the appearance of foliage symptoms of Dutch elm disease infection and hampered the start of summer scouting. Scouting was postponed in Connecticut but it was necessary to assign all available men to scouting on June 20 in order to complete the area scheduled for completion by the end of the month. A considerable number of trees that apparently showed wilting symptoms were observed prior to June 20 but were found to contain only storm-damaged branches. Late in the month only isolated cases of wilting were reported in Connecticut. Very few samples of discolored twigs suspected of harboring the Dutch elm disease fungus were collected in that State. In New Jersey wilting was reported early in June in a block of 100 slippery elms growing on a cliff in Kingwood Township, Hunterdon County. Most of these elms showed severe die-back, apparently due to last summer's drought. Eight or ten of them showed heavy wilt and discoloration apparently typical of Dutch elm disease infection.

Trap wood piles destroyed.--In mid-June destruction was started of 375 piles of elm logs placed early this spring throughout the New Jersey Dutch elm disease work area. Observations of these wood piles disclosed that both Hylurgopinus rufipes Eich. and Scolytus multistriatus Marsh. seemed to be well established. More H. rufipes were trapped than S. multistriatus. Although beetle infestations in this year's trap logs were not nearly so heavy as in those set out in 1939, a fair quantity of beetles was destroyed in this bark-beetle-reduction program. Trap logs set out in other sections of the work area were cleared up at the same time.

Storm damage clean-up.--Thirteen crews were engaged during June in elm-sanitation activities to clean up storm-damaged trees in Montclair, Verona, Cedar Grove, Caldwell, North Caldwell, West Caldwell, and Millburn, in Essex County, N. J. Four additional crews worked on the removal of elm trees likely to become infested with bark beetles. Approximately 95 percent of the standing trees containing potential beetle material had been removed by the end of the month. Clean-up of storm-damaged elms was half completed in the town of Morristown, Morris County, N. J.

First-record elm disease infections.--First records reported during the month involved two Pennsylvania townships. Confirmations were reported from Upper Merion Township, Montgomery County, and from the borough of Yardley, Bucks County, adding 15.5 and 0.87 square miles, respectively, to the Pennsylvania infected zone.

Scolytus emergence.--During the first week in June a heavy emergence of Scolytus multistriatus was noted in the southern section of the New Jersey infected zone. Observations disclosed heavy beetle attack in the piles of logs set out as traps.

Gypsy moth inspections.--Among the bulk inspections for gypsy moth infestation during the month were 10,000 birch tree tops ranging in length from 2½ to 3½ feet. They were shipped from the Westfield, Mass., district to La Porte, Ind., to be kiln-dried, dipped in a silvering solution, and manufactured into novelties. The district inspector at Manchester, Conn., certified under the Japanese beetle quarantine 380 tons of leafmold that was trucked to a nearby nursery, where it was combined with peat moss and stored for use as a packing for dormant rose bushes during the shipping season. A carload of feldspar, another of cable reels, 6 cars of lumber, 7 truckloads of rough granite, and a truckload of fireworks trellis comprised the items from which gypsy moth larvae were removed in the course of the inspection of material presented for certification. One hundred and thirty-five caterpillars were removed from products destined to various points in Connecticut, New Jersey, New York, and Maine.

Gypsy moth larvae in various stages of maturity.--Owing to the cold and rainy spring and summer in the New England States, gypsy moth larvae varied in their degree of maturity in various sections of the infested zone. From Concord, N. H., the district inspector reported very heavy gypsy moth feeding. He anticipated heavy defoliation. Heavy feeding of the caterpillars and partial defoliation were quite noticeable in eastern Massachusetts where woodlands in the vicinity of the granite quarries at Weymouth, Hingham, and Chelmsford were already from 25 to 60 percent defoliated. In these three towns the caterpillars, in search of food, were crawling across the quarries and freshly cut building granite. Many of these caterpillars were fully grown and ready to go into pupation on the granite and later deposit their eggs on it after the emergence of the moths.

Late gypsy moth hatch.--One of the New Hampshire district gypsy moth inspectors reported that he observed gypsy moth eggs hatching on the north sides of trees in Jackson on June 4 and at Gorham on June 6. This is unusually late. Both of these towns are in the White Mountain region where the late spring and heavy snow probably delayed hatching.

Brown-tail moth defoliation.--Heavy feeding and complete defoliation of apple orchards by brown-tail moth caterpillars were reported by district inspectors in the Concord, N. H., district, at Poland, Maine, and in towns along the coast from Salisbury, Mass., to Portsmouth, N. H.

FOREST INSECT INVESTIGATIONS

Ethylene dichloride emulsion controls root crown girdler of pine.--J. V. Schaffner, Jr., New Haven, Conn., reports on experiments conducted in September 1939 and in June 1940 in a plantation of Corsican and Scotch pine at Weston, Mass., to find a satisfactory method of controlling Hylobius radicis Buch. Eight insecticides were tested and, of these, ethylene dichloride emulsion (25%) proved to be most efficient and satisfactory. (For preparation of the emulsion, see E-424, "Ethylene Dichloride Emulsion for the Control of the Peach Borer.") This stand of Scotch and Corsican pine was planted in 1926. It is situated on one of the metropolitan water sheds where the topography is slightly rolling and the soil is fine sandy loam. Shortly after the hurricane of September 21, 1938, it was discovered that most of the trees were severely injured by H. radicis. In the first series of experiments the ethylene dichloride emulsion was applied September 13, 1939, around the base of the trees as a spray, using a compressed-air knapsack sprayer. Eighteen pints were used to treat 12 trees averaging 4.96 inches in diameter at the base. This treatment, which averaged 1½ pints per tree, killed all larvae of H. radicis without any apparent injury to the trees. On June 5, 1940, 14 trees, averaging 4.58 inches in diameter at the base, were treated. In this experiment the emulsion was poured around the base of each tree from a tin graduated quart measure, using ½ pint for trees under 4 inches in diameter and 1 pint for those over 4 inches. An examination of these trees on June 27 disclosed that only 1 tree contained living larvae. This tree, which was 6.5 inches in diameter at base, contained 11 dead and 4 living larvae. It was the largest tree treated in this series and the most heavily infested. Although these experiments were not conducted on a large scale, the results thus far obtained show that ethylene dichloride emulsion is very effective in killing H. radicis larvae, whether applied in the fall or spring.

Cold, wet weather retards development of spruce sawfly larvae.--P. B. Dowden, New Haven, reports that development of larvae of the European spruce sawfly (Gilpinia polytoma Htg.), at centers of heavy infestation in southern Vermont and southern New Hampshire has been considerably retarded this season on account of unusually cold and wet weather. In 1939 most of the first-generation larvae were in the fourth and fifth instars by the end of June, some larvae were already spinning cocoons, and heavy feeding was noticeable in the severely affected stands. This year most larvae were still in the third instar and feeding was not noticeable, although fifth-instar larvae could be found in small numbers. At the Marlboro, Vt., plot 3.18 inches of rain fell between May 23 and July 1, 1939, whereas 9.40 inches of rain were recorded for the same area between May 27 and July 1, 1940.

Control of Pineus pinifoliae on white pine.--R. H. Nagel, of the forest-insect laboratory at Coeur d'Alene, Idaho, gives some preliminary results of experiments directed toward the control of Pineus pinifoliae, a destructive insect pest of white-pine reproduction. Mr. Nagel states this insect can be readily controlled if treatment is made soon after the eggs have hatched. Nicotine sulfate, nicotine sulfate and oil, as well as derris and sulfonated castor oil, all gave entirely satisfactory results, with no apparent injury to the foliage. This insect has caused considerable damage in areas of white-pine reproduction and plantations.

Mountain pine beetle control.--A. L. Gibson, Coeur d'Alene, reports that recent experiments indicate the possibility of using a penetrating spray in the control of the mountain pine beetle in western white pine. A series of short white pine logs were treated under controlled conditions with a saturated solution of orthodichlorobenzene and naphthalene flakes in different proportions of fuel oil. As even the weaker solutions, intended as the lower extreme of these experiments, resulted in practically a complete brood mortality, the results obtained can be considered as promising. To test the effectiveness of this spray under field conditions, a large, thick-barked, heavily infested white pine tree was felled and treated with a medium concentration. Although a large portion of the overwintered brood had already emerged from the basal portion of the bole, nearly all of the remaining larvae, pupae, and new adults were destroyed. Should further field tests prove the effectiveness of this treatment in white pine, the adoption of this method of treatment may offer a lower cost of control.

Late-season attacks by Scolytus multistriatus not successful.--Members of the Morristown, N. J., laboratory have noted that when adults of the smaller European elm bark beetle (Scolytus multistriatus (Marsh.)) attack elm material late in the season, they are not successful in producing progeny the following year. An experiment begun by C. H. Hoffmann in 1939 illustrates this fact. Elm trees were cut at intervals and left in the field for a time before being cut into sections and placed in rearing containers at the laboratory. There has been no emergence of S. multistriatus adults this year from trees cut on and after September 15, 1939, even though attack was noted last year on trees cut as late as October 6. It is evident that, although beetles may lay eggs late in the season, larvae hatching from these eggs are not able to develop.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth spraying season moderately successful.--The type of weather prevailing during June governs, to a large degree, the success of the gypsy moth spraying program. Hot dry days cause the spray solution to dry quickly and allows the maximum quantity to adhere to the foliage. Calm days permit the spray to reach the tops of the highest trees and drift down through the foliage; whereas high winds flatten out the spray stream, making it difficult to cover the higher tree tops, and interfere with the uniform coverage of the foliage by the spray solution. General spraying began on June 3 under ideal conditions which persisted throughout the week, being followed by a week of unsettled weather. Frequent showers and heavy fogs saturated the foliage in most New England localities and to a lesser extent in Pennsylvania. There was a marked absence of sunshine and little movement of air during the brief periods when spraying was possible, and enough of the lead arsenate would have been washed from the leaves to necessitate respraying of much of the area, had it not been for the fish oil now regularly added to the solution as an adhesive. The weather during the week ended June 22, when most of the spraying work was concluded, was even worse. Unseasonably low temperatures prevailed throughout New England during the latter part of the week, with killing frosts and snow flurries in some localities, and daily strong winds. These conditions prevented the satisfactory spraying of high growth on exposed elevations and it was necessary to confine the work to sheltered spots. Spraying work in all States except New York was discontinued by the middle of the last week in June so that there would be sufficient time to wash the hose and other equipment and move it to the storehouses before the termination of W. P. A. gypsy moth work for the month. Little actual spraying was accomplished during the first part of the final week, as heavy showers made such work impracticable. As the season had been cold and backward before the spraying work started, the hatching of the gypsy moth eggs was delayed and the development of the caterpillars was slower than usual. Because of this, it would have been possible to extend the spraying season well into July, with better results, had employment considerations been favorable and sufficient spraying material available.

Work performed during gypsy moth larval season.--In Vermont some gypsy moth scouting work was done during the first part of the spraying season, chiefly in the northern section of the barrier zone. This work was somewhat slowed up as the foliage became more dense and interfered with the close examination of the tree tops. It was necessary to dismiss 50 men from the W. P. A. rolls on June 12 but a few crews were retained to continue scouting in important localities in Orleans and Lamoille Counties, where no scouting had been done for several years. Two spraying crews were retained to complete the spraying work planned in Bristol and Middlebury Townships, in Addison County, and a small force was also used to patrol burlap-banded trees at infested locations in Addison and Rutland Counties. These crews found and crushed only a few gypsy moth larvae at a majority of the sites visited, which indicates that these infestations are relatively small. In Massachusetts each of the 7 sprayers in the barrier zone area started operating on two 6-hour shifts, permitting continuous spraying for 12 hours daily, but it was necessary to reduce some of them to a single-shift basis because of the daily resignations of workers to enter private employment. All foliage had developed sufficiently to hold the spray satisfactorily at the beginning of the spraying season, except that of swamp white oaks, which are comparatively rare. The work progressed through the month with no interruption from mechanical failures. Water supplies held out during the season, although it was necessary to conserve them on some of the smaller streams by building temporary earthen dams, so that the water would accumulate during the night for use the following day. In some cases it was necessary to use great care in spraying wood edges bordering hayfields and grazing land, so that the strong shifting winds that prevailed at times would not blow the spray into the fenced areas. Large numbers of gypsy moth caterpillars were crushed by men patrolling burlap bands at infested locations east of the barrier zone area, but the larvae were much less abundant at banded infestations within the barrier zone. In Connecticut the labor problem was also acute. In the barrier zone 8 sprayers started work, 6 on a 12-hour double-shift basis and 2 on an 8-hour single-shift, but this schedule could not be maintained. On days unfit for spraying the workers were detailed to burn brush, band trees with burlap, and patrol trees already banded to destroy all gypsy moth caterpillars hiding in the shelters. Spraying from the autogiro, in cooperation with the State entomologist, was begun on June 7 near Granby and over 400 acres of woodland was treated during the season. In New York, owing to heavy rains during the first part of the last week in June, arrangements were made for the State conservation department to continue gypsy moth spraying work up to the last day in the month, with the understanding that C. C. C. or regular State employees would wash the hose and deliver it to the storehouse during the first week in July. In Pennsylvania woodland spraying for the gypsy moth was started on June 3, with 27 machines operating, 15 of which worked on the double-shift basis, and the remaining 12 on single-shift. Twelve of the sprayers had been used previously on residential spraying work. Fifteen sprayers operated in 7 townships in Lackawanna County, 8 sprayers in 3 townships in Luzerne County, 2 sprayers in 2 townships in Carbon County, and 2 other sprayers in 2 townships in Monroe County. The sprayers operated on a double-shift basis discontinued work on June 22, and those on single-shift by June 26. Although the spraying season was short, much work was accomplished, including all the important isolated infestations in Mauch Chunk and Lehigh Townships, in Carbon County, and in Clifton and Covington Townships, in Luzerne County.

All sprayers in field visited daily by mechanics.--Mechanics from the gypsy moth repair shops, traveling in small trucks equipped with complete sets of tools and carefully selected sets of replacement parts, were constantly in the field during the spraying season. They made regular daily inspections of all sprayers and were prepared to make adjustments or repairs on any of the various types of sprayers and motor vehicles in use at that time. Each spraying machine was visited at least once a day, and those operated continuously for 12 hours on the double-shift basis were visited twice each day when possible. It often happens that minor repairs and adjustments made at the proper time prevent important delays that would otherwise occur, and serious and costly breakdowns of spraying machines during the gypsy moth spraying season have been rare since this activity first adopted the practice several years ago of daily visits by competent mechanics.

All W. P. A. gypsy moth work suspended.--As project applications for W. P. A. gypsy moth work during the fiscal year 1941 had not been approved by the end of June, the services of all workers assigned to gypsy moth projects in the States of Connecticut, New York, and Pennsylvania were terminated on the last working day in June, and workers in Vermont and Massachusetts were advised that work was suspended until the project applications for these States had been approved. These arrangements were based on information obtained from the W. P. A. Division of Employment in each of the States concerned. As it is not definitely known when the project applications will be approved, arrangements have been made to assemble all regular agents who can be spared from other work at the storehouses in Massachusetts and Pennsylvania to test the hose and place it in storage. This work is necessary in order to minimize the deterioration of the hose from exposure to the sun on hot, humid days. Other regular employees were engaged in inspecting fences erected to exclude animals from the sprayed areas and in examining sites where sprayers had been set up during the spraying season to make certain that all traces of lead arsenate had been removed and the areas left in good order.

Spray hose damaged by hedgehogs.--Lines of gypsy moth spray hose extending over ledgy ground in dense woods in regions where hedgehogs are abundant in Bristol and Middlebury Townships, Addison County, Vt., were gnawed by these animals. This type of damage has been noted several times during the last few years, the first occurring in Massachusetts in 1935. On this occasion the fabric underlying the rubber covering on several lengths of hose was so seriously damaged by these animals that the hose burst when subjected to high pressure.

C. C. C. gypsy moth work during June.--The amount of time spent on gypsy moth work during June ranged from a high of 2,200 6-hour man-days in the first week to a low of 1,555 man-hours for the week ended June 29. The reduction in work was due partly to stormy weather and partly to the completion of an enrollment period. The quarterly ending of enrollment periods seriously interferes with the volume of work accomplished, as men who have accumulated leave are discharged in advance of the final date for the period, leaving the crews shorthanded, and considerable time must also be used in instructing the new enrollees and training them for their duties at the beginning of each new enrollment period. Spraying selected areas with lead arsenate was the principal activity in Massachusetts and Connecticut during June, the spraying equipment having been supplied by the Bureau of Entomology and Plant Quarantine and the State of Connecticut, and the insecticides by the C. C. C. camps and the State of Connecticut. Some thinning and tree-banding work was also done. As no spraying equipment was available for C. C. C. spraying work in Vermont, the work in that State consisted mainly of thinning and burlapping. C. C. C. spraying work was begun on May 27 at several locations where the foliage had developed sufficiently to hold the poison and was extended to other areas as the leafage unfolded. Although the rainfall during June was slightly below normal, the storms were so scattered through the month that the water supply remained adequate for spraying purposes at practically all locations. Moving the spraying machines from one location to another, setting up the equipment and laying new hose lines caused the loss of some time from actual spraying work. This is in contrast with last year's work, when most of the C. C. C. gypsy moth spraying was done in one block and extensive moving of equipment was not necessary. There were no serious delays caused by the breakage of equipment or hose. All of the sprayers used by the C. C. C. in Connecticut, and three of the four machines used in Massachusetts, were used on the double-shift basis until near the end of the month, when the return of some of the enrollees to their base camps to prepare for discharge made it necessary to reduce the work to single shifts. The excellent cooperation of property owners and various State and C. C. C. officials enabled the crews to accomplish a great deal of spraying work. In one case a Water Board property in Massachusetts donated 1 ton of lead arsenate for use by the C. C. C. in spraying infested Water Board property adjacent to other areas already sprayed by the C. C. C., thus aiding materially in controlling the gypsy moth in that region.

Dead trees noted in areas previously defoliated by gypsy moth. A considerable number of dead and dying chestnut oak, white oak, hemlock, and some white pine trees were noted by C. C. C. officials during a field trip in Connecticut. These casualties followed 1- or 2-year defoliation by the gypsy moth. A similar condition was reported in oak trees in Vermont.

PLANT DISEASE CONTROL

Stem rust in Middle West.--The rust situation in the Middle West on July 10 has been summarized by E. C. Stakman, in charge of rust surveys, as follows: "There are now indications that stem rust will cause considerable damage in the east-central part of Kansas this year. About a third of the wheatfields have been severely damaged in the Emporia, Florence, Eldorado, Newton, and McPherson areas. Fields of Chiefkan, however, of which there are many, show no kernel shrinkage. Although rust has increased considerably on late wheat in Iowa, particularly weak-strawed varieties in which there has been lodging, heavy infection is not general enough to cause more than slight loss for the State as a whole. The varieties Iowin and Iobred have been resistant wherever examined. Wheat was being cut last week. Along the western edge of the winter-wheat belt there is practically no stem rust infection, according to recent observations made between Perryton, Tex. (in the northern Panhandle), and Scottsbluff, Nebr., where all grain was ripe. On July 7, ripe wheat in extreme northeastern Colorado, in Sedgwick and Phillips Counties, had only a trace of rust."

Stem rust causing some damage in Illinois and Indiana.--Damage in central Illinois has been less severe than expected earlier in the season, for rust has caused little injury in the southern or central parts of the State. In southern Wisconsin only negligible damage is expected to winter wheat. Indiana wheat is escaping serious damage by maturing before rust becomes severe, but some damage has been done. It is estimated for Ohio that rust has caused 1-percent damage to wheat and a trace of damage to barley. Wheat has matured in the southern and central parts of Ohio, Indiana, and Illinois and is now in soft- to hard-dough stage as far north as southern Wisconsin. Considerable variation in the stage of development of wheat in Pennsylvania will be responsible for injury to late fields there, and in some sections of Virginia barley, rye, and wheat have been damaged. Winter wheat in southern Minnesota will escape serious stem rust damage in the aggregate. It now appears that injury will be limited to spots in which heavy infection has developed and where considerable rust has appeared on the necks of plants. On the whole, however, damage will not be serious. Barley also will escape loss unless rust increases very rapidly. Grains in Minnesota are somewhat later than a year ago, winter wheat ranging from medium dough to ripe, barley mostly in medium dough, and spring wheat in soft dough.

Rust on susceptible spring wheat in southern Minnesota.--Moderately heavy rust has developed on the few fields of susceptible spring wheat that can be found in southern Minnesota. One field of Ceres wheat observed on July 4 in the milk stage had 15 or 20 percent of rust on 75 percent of the stems, and pustules were just breaking out on the necks. With 3 weeks remaining before harvest, there is opportunity for considerable damage under favorable conditions. The amount of susceptible wheat in the State, however, is very small. Thatcher wheat in the same area had only a trace of rust. A large increase in the number of stem rust spores was noted on slides exposed at St. Paul on July 5 and 6. From present indications, drought is likely to be more destructive than rust on spring wheat in the

Dakotas. Harvest is now well under way in southeastern South Dakota and heavy rust infection is present in only a few late fields of winter wheat.

Progress maps for county agents offices in Iowa.--To promote closer working relations with county agents in Iowa where barberry-eradication crews are operating, a 17- by 22-inch map mounted on a good grade of pressboard large enough to allow for a suitable margin is hung in a conspicuous place in the county agent's office. Map tacks of contrasting colors are used to designate properties in the county that have been found infested with barberry bushes. A legend in the upper right-hand corner and a short statement relative to the barberry situation in the county make the map a rather complete demonstration in itself. According to Arlo H. Hagge, assistant State leader in Iowa, new tacks are added to the map as new properties are found, thus the county agent and farmers who visit his office are kept currently informed of progress both with respect to area covered and bushes destroyed.

Progress in control operations with emergency funds.--Since emergency funds were first used in Iowa in 1933 for barberry-eradication work, more than 113,000 barberries have been destroyed on 3,953 properties. More than 31,000 square miles have been intensively surveyed by these P. W. A. and W. P. A. crews of men. Resurvey work has been carried on in conjunction with the regular survey and all former bush properties within the area have been carefully reinspected. During the last 5 years, 25 percent of all Iowa resurvey properties have been rechecked and barberries have been found on 23 percent of the old locations. It is of interest that the area covered since 1933 comprises much of the rough, wooded area of the State. The results indicate clearly the value of this labor program and emphasize the need for continuing this or some similar type of work.

Funds used	Area surveyed	Properties with barberry bushes	Barberry bushes destroyed
	Square miles	Number	Number
P. W. A.----	3,372	1,251	50,322
W. P. A.----	27,245	2,702	63,022
Total-----	30,617	3,953	113,344

Blister rust control program for 1940 in sugar-pine region.--Plans for blister rust control work in the sugar-pine region for 1940 call for the employment of 3,110 men. More than 2,000 of this number were actively engaged in Ribes-eradication work during May, and the remainder were being placed as fast as camps could be constructed and manned. This force is expected to cover approximately 185,000 acres of timbered land during the current field season. There will be 40 camps established in the sugar-pine region, extending from the Siskiyou National Forest of southern Oregon southward through the Klamath National Forest, Lassen Volcanic National Park, and Lassen, Plumas, Eldorado, and Stanislaus National Forests, thence to the Yosemite and General Grant National Parks and the Sierra National Forest. Four Federal agencies are engaged in control work, namely, the Forest Service, the National Park Service, the Oregon and California Revested Lands

Administration, and the Bureau of Entomology and Plant Quarantine. The last-named agency acts in a technical supervisory capacity for all field operations within the region, as in previous years. The work is distributed by agencies as follows: Forest Service, 7 C. C. C. camps composed of 640 men, 8 E. R. A. camps composed of 600 men, and 7 regular camps composed of 235 men. This totals 22 camps composed of 1,475 men. The National Park Service has 9 C. C. C. camps composed of 665 men, the Bureau of Entomology and Plant Quarantine 8 E. R. A. camps composed of 910 men (2 camps and 220 men in Oregon), and the Oregon and California Revested Lands Administration has 1 C. C. C. camp of 50 men (in Oregon). This makes a grand total of 40 camps containing 3,110 men. The greater part of the work outlined in the program for Ribes eradication will be done on the Plumas and Eldorado National Forests. At the beginning of the present season a total of 780,251 acres within established control units had been given initial treatment and of this area a large part had received two or more successive workings to maintain full protection from the disease. The scouting work performed during 1939 indicated that white pine blister rust was comparatively inactive during that year. This was encouraging to the control forces, which had faced a rapid expansion of the rust during the previous 3 years.

W. P. A. employee proves good blister rust scout.--The "Man of the Week" among the W. P. A. workers in Jackson County, Mich., is Floyd McCrum, who, after being shown a sample blister rust canker, set out to find the disease in Jackson County, where he is employed on the local blister rust control project. He succeeded in finding two fruiting cankers, one on 1935 wood and the other on 1936 wood, in the pine area they were protecting, a 9-acre, 20-year-old plantation. This was the first pine infection ever found in this county and was an important discovery, as it extends the range of known pine infection about 30 miles farther south and close to the Ohio border. As this infection is far removed from any known active infection and in a county having practically no native pine, it shows that no pine area in the State is safe from the rust as long as Ribes grow nearby. A few days later, on June 28, Mr. McCrum brought in the first infected Ribes leaves ever reported in Jackson County. The infected leaves were from R. cynosbati bushes and showed the uredinial stage of the disease.

Reconnaissance of sugar pine control units in California.--Early in June a small reconnaissance party was sent to the Trinity National Forest in northwestern California to make a survey of previously established sugar pine control units in order more definitely to evaluate the sugar pine stands and more precisely to delimit the boundaries of the units. The party consists of six picked W. P. A. workers, all of whom have had several seasons of experience in Ribes eradication, a cook, and the chief of party. The reconnaissance is based on the public land survey of township and section (640 acres). Four strips each 1 mile long and 16½ feet wide, spaced at 20-chain intervals, are run through each section. For the entire length of each strip Ribes are counted and recorded by 1-chain transects; on 1/10-acre plots distributed along the strip at intervals of 10 chains, sugar pines are counted by four size classes. Summaries are made of both sugar pines and Ribes on a per-acre basis for each section. In the course of the reconnaissance, section corners of the land survey must be found and properly posted with metal tags in order to facilitate later work in the region. As the original surveys date from the last quarter of the last century, relocation work often involves much ingenuity. Through the end of June, 44,500 acres of sugar pine type in one of the major units were examined, which, according to the data gathered, support a per-acre average of 17 Ribes and 97 sugar pines of all sizes. The species of Ribes so far found are R. cruentum, R. lacustre, R. navadense, and R. lobbii. Many sections were found to support exceedingly small populations of Ribes, even along streams, and the maximum density per section is about 100 bushes per acre. Most of the Ribes are confined to the vicinity of streams and draws. In the area thus far sampled the sugar pine is not to be compared in quality with that occurring in the optimum range of the species in the central and southern Sierra Nevada. It largely occurs on sites 2 and 3. However, comparative scarcity of Ribes, which would render the cost of protection against white pine blister rust relatively low, places this unit higher in the scale of priority of protection than would otherwise be the case. Some of the time of the chief of party is spent in an ocular appraisal of other white pine stands on the forest. The value of the pine in most of these stands is questionable and should be determined by reconnaissance surveys similar to the one now in progress before protective work is undertaken. One unit, however, which lies in the northeastern part of the forest and the adjoining part of the Shasta Forest, was found to support a good stand of sugar pine. A few sample plots taken at random showed that this stand supports from 40 to 800 trees per acre and that the count on from 40,000 to 50,000 acres would average about 200 sugar pines of all size classes per acre. In this unit, also, Ribes appear to be unusually sparse.

COTTON INSECT INVESTIGATIONS

Calcium arsenate and mixtures of calcium arsenate and sulfur for boll weevil control.--Tests were made at State College, Miss., in 1938 and 1939 by R. L. McGarr to compare the efficacy of calcium arsenate and 1-to-2 and 1-to-1 mixtures of calcium arsenate and sulfur, and also to compare small plots (1/10 acre) with large plots (2/3 and 3/5 acre) for control of the boll weevil. In 1938 the average gains of seed cotton and profits per acre for 12 1/10-acre randomized-plot tests where the boll weevils were fairly abundant and an average of 4 effective poison applications had been applied, were as follows: For the 1-to-2 mixture, 300 pounds of seed cotton and a profit of $7.05; for the 1-to-1 mixture, 294 pounds and a profit of $6.46; and for the calcium arsenate alone, 266 pounds and a profit of $6.16. The average production for the 12 check plots was 1,082 pounds per acre. In 3 2/3 acre-plot tests in early planted cotton, where the boll weevil infestation was not high and an average of 2.7 effective poison applications had been made, the calcium arsenate alone gave a gain of 145 pounds of seed cotton and a profit of $2.85 per acre, as compared with 91 pounds and a profit of $0.57 per acre for the 1-to-2 mixture. The average yield for the three check plots was 1,096 pounds per acre. In 3 2/3-acre plot tests in late-planted cotton where the boll weevil infestation was heavy and an average of 6 effective poison applications were applied, the 1-to-1 mixture showed a gain of 666 pounds and a profit of $17.84 per acre, as compared with a gain of 626 pounds and a profit of $17.37 per acre for the plots treated with undiluted calcium arsenate. The average production for the 3 check plots was 1144 pounds per acre. In 1939 the average gains of seed cotton and profits per acre for 10 1/10-acre randomized-plot tests, where the boll weevils were abundant and the bollworm infestation was light to moderate late in the season, were as follows: For the 1-to-1 mixture, 763 pounds and a profit of $20.81; for the calcium arsenate alone, 698 pounds and a profit of $19.79; and for the 1-to-2 mixture, 616 pounds and a profit of $16.01. The average production for the 10 check plots was 588 pounds per acre. An average of 8 effective poison applications were made of each treatment. In 4 3/5-acre randomized-plot tests in the same field with the 1/10-acre plot tests, where the boll weevil infestation was heavy and the bollworm infestation was moderate late in the season, the 1-to-2 mixture gave an average gain of 628 pounds of seed cotton and a profit of $18.11 per acre; the 1-to-1 mixture, 620 pounds and a profit of $17.46; and the straight calcium arsenate, 570 pounds and a profit of $16.64. The average yield per acre for the 4 check plots was 517 pounds. An average of 5.8 effective poison applications were made of each treatment, or 2.2 fewer poison applications were needed to control the weevils in the larger plots than in the 1/10-acre plot tests. In both years the mixtures were used in all tests at the rate of 12 to 14 pounds per acre and the calcium arsenate at 6 to 7 pounds per acre. The large increases in all the tests in 1939 were not only due to the control of the boll weevil but also in part to the control of the bollworm. The bollworm damage was in proportion to the amount of calcium arsenate applied, the damage in the treated plots being the highest where the 1-to-2 mixture was used. The yield records for the 2 years' tests showed that calcium arsenate and the 2 mixtures were about equally effective in controlling the boll weevil and that each gave good results. The yield records indicated that plots 1/10 acre in size were very satisfactory for experimental purposes in controlling the boll weevil.

Pink bollworm situation in lower Rio Grande Valley.--Investigations made at the Brownsville, Tex., laboratory, in cooperation with the Division of Pink Bollworm and Thurberia Weevil Control, are briefly summarized, as follows: Examination of 7,980 cotton squares from 65 fields in 7 localities within a 25-mile radius of Brownsville, Tex., between April 25 and May 13, gave negative results so far as the pink bollworm was concerned. A few squares were infested with Noctuelia rufofascialis Stephens. The first pink bollworm found in 1939 was collected in a cotton bloom on May 1, but in 1940 the first collection was not made until May 13, when the first pink bollworm was found in a cotton bloom. Between May 13 and 31 a total of 854,345 blooms were examined in 430 fields, and 20 fields, or 4.6 percent, were found to be infested and a total of 79 pink bollworms were collected from the blooms. On the American side 32 pink bollworms were found in 11 fields in Cameron County and 1 in Hidalgo County. All were found adjacent to or not far from the Rio Grande between Brownsville and Weslaco, south of Highway 83. On the Mexican side of the river 46 infested blooms were found along the river for a distance of 35 miles between Matamoros and Rio Rico, 24 of these being found in 4 fields located from 5 to 18 miles northwest of Matamoros and 22 within 6 miles of Rio Rico. Bloom-infestation records indicate wider distribution of the pink bollworm than in 1939. Last year infested blooms were found only 9 miles northwest of Brownsville, whereas this year an infestation in blooms was found 45 miles northwest of that city. In 1939 infested blooms were found 16 miles northwest of Matamoros while in 1940 an infestation was found in blooms about 35 miles northwest of that city. No pink bollworms have been found in okra since last December. Pink bollworms were not found in May 1940 in any host plant except cotton.

Naphthalene ineffective against thrips and aphids on cotton.--Based on reports that naphthalene dust was being recommended for thrips and aphids on cotton, M. T. Young and assistants conducted a test against thrips at Tallulah, La., during June. They used 1/40-acre plots arranged in randomized blocks with six replications. A commercial mixture of 60 pounds of ground crude naphthalene and 40 pounds of calcium carbonate was applied to small cotton at the rate of 19 to 20 pounds per acre in the early morning, at midday, and late in the afternoon. Two applications failed to reduce the population below the checks, which averaged 2.7 thrips per plant. No records were made of the effect on aphids, as very few were present at the time the tests were begun. However, in tests against aphids conducted by E. W. Dunnam at Stoneville, Miss., no mortality of aphids was obtained with 25, 38, or 60 pounds of naphthalene dust per acre.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Lower Rio Grande Valley.--Planting of the cotton crop in that portion of the south Texas regulated area designated as the lower Rio Grande Valley was restricted to the period February 20 to April 20 for the 1940 season as one of the principal measures in the program for suppressing the pink bollworm in that area. The first open cotton bolls of the season were found about the middle of June, this field having been planted on the opening date of the restricted-planting period. There was an elapsed time of approximately 4 months from the date the field was planted until the first open bolls were noted. The active 1940 cotton season opened in that area with the ginning of the first bale of cotton on June 28. Regulations promulgated by the State require that cottonseed be sterilized as a continuous process of ginning for the 1940 cotton crop in the lower valley counties. Consequently, there was considerable activity in that area during June in regard to the installation of sterilization units in gins not previously equipped for such operation. Most of the sterilizers being installed in that district are of the dry-heat type developed by this Division last season.

Inspection of okra in lower Rio Grande Valley.--The finding of pink bollworm infestation in okra fields in the lower valley district around the close of the 1939 cotton season, resulted in an amendment to the pink bollworm quarantine, requiring inspection and certification for the movement of okra out of the regulated area. The 1940 spring okra season opened in May, and inspection and movement of this material continued to be fairly heavy throughout June. For the period, 223,418 okra forms were inspected, with negative results as to pink bollworm infestation. Since the beginning of okra inspection for the present season, 340,071 forms have been examined, and no infestation has been found. At the end of June, 152 dealer-carrier permits had been issued for the movement of okra outside the regulated area; however, at the end of the period 33 growers had discontinued shipping.

The Coastal Bend district.--This area under regulation on account of the pink bollworm lies directly north and northwest of the lower Rio Grande Valley, embracing practically all cotton-growing counties from Nueces on the east to Maverick on the west. The eastern part of this area was brought under regulation in 1938 as a result of pink bollworm findings in that same year, and was extended across the State to the west in 1939 as the result of spread of the pink bollworm from the focal point near Brownsville, in the lower valley area. Very favorable conditions for the development of the cotton crop prevailed throughout that area during June. Lack of moisture in some sections, and destruction of the crop by storms in others, resulted in considerable late planting and replanting, and at the end of the month cotton could be found in all stages of growth from plants containing open bolls to fields that had been recently planted. The ginning season is expected to open in that area around July 15, but it is not believed there will be any considerable amount of cotton ginned prior to August 1. Sterilization of seed as a continuous process of ginning was required for the 5 original Coastal Bend counties for the 1939 crop. This regulation, however, was not put into effect last season in the new counties involved through pink bollworm findings in the 1939 crop, as infestation was not discovered in that area until late in the season and facilities were not available for the sterilization of seed as ginned. For the present season, however, regulations require the sterilization of seed at all gins operating within the Coastal Bend district, and at the end of June sterilizers had been installed or were in process of installation at practically all gins.

Situation in the Big Bend.--Cooperative control measures carried out in the Presidio-Ojinaga area of the Big Bend of Texas and Mexico under the 2-year plan for the years 1938 and 1939, which brought about such outstanding results in the reduction of the heavy pink bollworm infestation in the 1939 cotton crop, were again put into effect in that area for 1940. Suppressive measures under this plan, calling for the cleaning of fields immediately after harvesting, a delayed-planting date, and the destruction of all stub cotton so as to deprive pink bollworm moths of food until the peak of spring emergence is over, have been carried out very successfully on both sides of the Rio Grande. Conditions during June have been favorable for the development of the cotton crop and the first blooms occurred in the Presidio Valley around June 20 from cotton planted April 20, the beginning of the restricted-planting period. Toward the close of June bloom-infestation counts were being made in the earliest planted fields in the Presidio Valley by the Cotton Insect Research Division to determine the results of the control program with reference to pink bollworm infestation in the 1940 cotton crop.

Control in Arizona.--The program for the removal of stub cotton throughout the State of Arizona, which was made possible through cooperation of the Agricultural Adjustment Administration with the State of Arizona and this Bureau, for the purpose of creating an effective host-free period for the pink bollworm prior to the fruiting of 1940-planted cotton, was concluded at the end of May, as set out in our report for that month. Inspection of cottonfields has been carried on throughout June to observe the general progress of stub cotton, a considerable amount of which reappeared in fields after conclusion of the program, and any plants far enough developed to constitute a danger to 1940 plantings were removed. The development of the 1940 cotton crop within the zone of control operations was retarded to some extent by the farmers through irrigation and cultural practices, in an attempt to extend the host-free period for emerging pink bollworm moths; and, as a result of such cooperation, very few blooms were present in the earliest planted cotton prior to June 10. In connection with the inspection of fields in regard to the development of stub cotton, inspectors have also been engaged during June in collecting data on planting, squaring, blooming, and fruiting dates of long- and short-staple cotton throughout all cotton-producing sections of the State. Such information is considered essential in carrying out control measures for the suppression of the pink bollworm having to do with the creation of starvation periods during the period of most active moth emergence.

Wild-cotton eradication in Florida.--The eradication of wild cotton from southern Florida and adjacent keys was begun several years ago when it was found that these plants were heavily infested with the pink bollworm. Such an undertaking was considered expedient in order to deprive this very destructive cotton pest of a host on which to propagate, and thus prevent its spread into domestic cotton-growing areas of the United States. Because of unfavorable weather conditions, no attempt is made to carry on eradication work in Florida during the summer months and, with the exception of some scouting activity (completed during the last 2 weeks of the period), this work was brought to a close on June 15. All of the area was cleaned twice last season and much of the acreage was gone over the third time. It is believed that the entire area is being left in very good condition, and that the program will not be endangered if eradication work can be resumed by the usual time in the fall. During the period worked in June, a total of 1,174 acres was recleaned, resulting in the finding of 5 plants with mature bolls and 19,772 sprout plants. Also, 27 mature plants were found along railroad rights-of-way, which had been cut back during previous seasons by railroad-maintenance crews.

Thurberia-plant eradication in Arizona.--The program for the destruction of Thurberia plants in the Tortillita and Santa Catalina Mountains of southern Arizona was brought to a close on June 15. This program was begun in 1935, when it was determined that these plants were heavily infested with a native boll weevil which was making its way to adjacent domestic cotton plantings. At the completion of this project all areas to be cleaned under the initial plan for this work had been covered twice and practically all of the Tortillita Range had been gone over 3 times. During the period worked in June, 2,560 acres were covered, resulting in the location and destruction of 1,431 Thurberia plants. Since the inauguration of this project in 1935, a total of 376,650 acres has been covered and 2,055,539 Thurberia plants have been destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Tobacco moth survives winter and breeds in packhouses.--C. F. Stahl and W. A. Thomas, of the Oxford, N. C., laboratory, found that larvae of Ephestia elutella (Hbn.) passed the winter in trash in packhouses of the tobacco growers and that adults appeared during the period April 11 to June 19. Adults of a new brood began to emerge in packhouses on the latter date. The moths emerged from a variety of materials collected as trash in packhouses, including shelled corn and corn in the shuck. Definite evidence was obtained at Farmville and Reidsville, N. C., that the tobacco moth moved during May from infested packhouses to nearby open-storage units of tobacco in hogsheads. As many as 6,187 adults of the tobacco moth were captured on flypaper strips suspended in a single large packhouse during the period April 30 to May 28.

Nicotine dust superior to rotenone dusts for cabbage aphid control.--In field tests conducted at South Point, Ohio, N. F. Howard and his associates of the Columbus, Ohio, laboratory, found that a dust mixture containing nicotine was superior, in controlling Brevicoryne brassicae (L.) on cabbage, to the rotenone-tobacco-dust-sulfur-dust mixture now recommended for turnip aphid control in the South. Sulfur nitride was ineffective and it was necessary to apply the nicotine dust mixture to these plots in order to prevent serious injury by the aphid. The grower was harvesting Grade A 1 cabbage from the plots treated with nicotine-dust mixture. A field of cabbage nearby, which was infested severely by the cabbage aphid and not treated with any insecticides, was practically a total loss. The plants were small and stunted. Although parasites and predators reduced the aphid population to a low point, this occurred too late to save the crop.

Toxicity of rotenone possibly influenced by diluent used.--An experiment was conducted by L. W. Brannon, of the Norfolk, Va., laboratory, for the control of Epilachna varivestis (Muls.) on beans near Drivers, Va., under conditions of unusually heavy infestation. The average infestation on 4 plots just prior to application was 36.5 beetles, 37.2 egg masses, and 1.5 newly hatched egg masses on 25 feet of bean row. The effectiveness of 6 commercially prepared rotenone-bearing dust mixtures was compared with that of 2 prepared in the laboratory. Based on analysis made by the Division of Insecticide Investigations, the treatments were applied so that approximately the same quantity of rotenone was applied per acre. Best foliage protection from beetle injury was obtained from the derris-talc mixture prepared in the laboratory to contain 0.5 and 0.75 percent of rotenone, there being no difference in the degree of control obtained by the 2 treatments. Following in order of effectiveness were commercial dusts No. 1, which contained 0.65 percent of rotenone, No. 2 with 0.71 percent, No. 3 with 0.88 percent, No. 4 with 0.79 percent, No. 5 with 0.95 percent, and No. 6 with 0.32 percent. It is interesting to note that commercial dusts Nos. 2 and 6 were so-called impregnated dusts, No. 2 being not quite so effective as the laboratory-prepared mixtures and No. 6 giving unsatisfactory control. A mixture of derris and tobacco dust containing 0.5 percent of rotenone, prepared in the laboratory, was not so effective as a derris-talc dust mixture similarly prepared to contain 0.5 percent of rotenone. This, together with the fact that dust No. 5 containing 0.95 percent of rotenone and No. 4 with 0.79 percent were not as effective as a laboratory mixture of derris and talc containing 0.5 percent indicates that the differences in the degree of control obtained with the different dusts may have resulted from changes in the toxicity of the rotenone as affected by the carrier used. This is further indicated by the fact that Dust No. 4 containing 0.79 percent of rotenone, and having clay as the diluent, did not give as good foliage protection against the beetle as the derris-talc mixture prepared in the laboratory to contain 0.5 percent of rotenone.

Toxicity of rotenone-bearing dust to pea weevil.--F. G. Hinman and W. E. Peay, of the Moscow, Idaho, laboratory, report from small-scale tests directed against Bruchus pisorum (L.) that a dust mixture containing 0.5 percent of rotenone and 1 percent of 2,4 dinitro-o-cyclohexylphenol proved to be more toxic to pea weevil adults than dust mixtures containing either of these component parts. They also report that the toxicity to the weevil of a dust mixture containing 0.5 percent of rotenone was not increased by the addition of 10 percent of paris green nor of 10 percent of cryolite.

Dinitroorthocyclohexylphenol compounds highly toxic to wireworms.--Preliminary tests conducted in the laboratory by C. E. Woodworth, at the Walla Walla, Wash., laboratory have shown several of the Dinitroorthocyclohexylphenol compounds to be very toxic to wireworm larvae (principally Limonius californicus Mann. and L. canus Lec.). Some of these compounds proved to be more than 50 times as toxic as dichloroethyl ether. The toxicity of aqueous dilutions was apparently increased when soil was added.

Seedlings may be injured by dichloroethyl ether treatment.--Although previous experiments have shown that dichloroethyl ether, within prescribed limits, has given evidence of promise as an effective soil treatment against certain wireworms in the West, recent studies conducted at the Alhambra, Calif., and Walla Walla, Wash., laboratories, have definitely shown that this treatment will injure certain plants. At Alhambra, R. E. Campbell found that a solution containing 1 to 12 cc. of dichloroethyl ether per gallon of water had no deleterious effects whatever upon the germination of watermelon seed under laboratory conditions. However, there was some indication that a concentration of 9 cc. per gallon impaired germination in the field (1 quart to the hill at seeding time). He also found that in most instances concentrations greater than 3 cc. per gallon of water at the rate of 1 to 2 quarts per hill caused mortality or seriously injured newly set tomato plants. R. S. Lehman, Walla Walla, found that a single application of dosages ranging from 1/2 to 3/4 cc. of dichloroethyl ether per hill at the time of seeding, on field corn, caused definite chemical injury to the growing plant. Sweet corn exhibited no injury from a single application of the treatments, but did show injury after two applications.

Progress in discovery of sugar beet strains resistant to beet leafhopper.--Studies by F. R. Lawson at Twin Falls, Idaho, to determine the possibilities of discovering a sugar beet resistant to Eutettix tenellus (Bak.) showed that considerable differences were found in the number of leafhopper eggs deposited in five strains of beets. Analysis of the data showed that leafhoppers oviposited more freely on the larger plants, regardless of the strain, and that there was actually no significant difference between strains when the areas and volumes of the leaves under test were considered. The differences in production of living leafhoppers on six inbred strains and a check were highly significant, which is believed to be a measure of plant resistance to the beet leafhopper. It has also been found that certain individuals and strains of beets develop lesions at the points of injury where leafhopper eggs are deposited in the petioles and veins, the eggs being forcibly extruded from the tissues before hatching occurs.

INSECTS AFFECTING MAN AND ANIMALS

Rearing of Stomoxys.--Craig Eagleson and Carr Smith, of the Dallas, Tex., laboratory, report rearing stable flies throughout the winter months. So far as known, this is the first successful attempt in so doing. Novel features of the method include a large stock cage, cypress larval-rearing boxes, simple breeding media, and a minimum of work.

Tobacco smoke effective in killing horn flies.--According to W. G. Bruc Dallas, smoke generated by burning tobacco stems in a bee smoker was almost 100 percent effective in killing the horn fly (Haematobia irritans (L.)).

Bactericides as wound protectors.--Tests were made by E. W. Laake and Charles L. Smith, Dallas, to determine the value of bactericides in chemicals used for the protection of screwworm lesions in domestic animals. They report that these tests have proved phenomenal in that they have shown that the bactericidal action of a chemical is the mechanism of protection of a screwworm lesion. The mechanism of protection is apparently based on two factors--(1) the destruction of the bacteria and (2) the immediate drying and hardening of the necrotic tissues. Of 29 larvicides tested for their bactericidal properties, 7 showed good, 9 moderate-to-fair, and 13 no bactericidal properties.

Study of wound protectors in postmyiatic wounds.--E. W. Laake and Charles L. Smith have presented convincing data that the individual animal's inherent disposition and reaction to treatment and fly attack constitute a vital factor and, as such, must be taken into statistical consideration in any attempt to determine the value of wound protectors on a comparative basis. They conclude that, all other conditions being equal, a chemical applied to postmyiatic wounds will give remarkably uniform results with reference to period of protection from reinfestation and period of healing of all wounds. Also, that if considerable variations occur, such as more than a few days in the period of protection or the healing of wounds, regardless of the number of tests for any one material, these variations are due to different conditions of the wounds or the animals involved, and not to the chemical.

Feeding animals sulfur does not control lice and other pests.--O. G. Babcock, Sonora, Tex., reports that feeding a maximum of sulfur to goats and cattle over a period of 10 months failed to retard the development of biting and sucking lice, spinose ear tick, horn fly, and stable fly. Some of the animals were kept in dark stalls for 3 months, then exposed to the sunlight for the remainder of the test. The others were kept in pens in the open.

Sulfur-derris an effective dip for control of lice on range breeding cattle.--Mr. Babcock reports complete kills of the short-nosed cattle louse (Haematopinus eurysternus Nitz.) with a mixture of elemental 325-mesh sulfur, a mineral filler, and derris. Eggs were not destroyed.

Microapparatus.--Ingenious microapparatus has been perfected by C. S. Wilson, of the Beltsville, Md., laboratory, with which may be determined the presence of urease in organs as minute as the brain, heart, stomach, Malpighian tubules, and wing muscles of individual larvae and pupae of blowflies.

Maggot extract "F".--There has been a greater demand for this extract by medical cooperators than for any of the Bureau's former healing agents. William Robinson, Beltsville, states that 290 lots of this extract in 8-ounce bottles have been shipped out to 30 cooperating physicians and surgeons who are testing the extract on osteomyelitis cases in various parts of the United States. A claim for a Public Service Patent on Extract "F" is being handled through the Solicitor's Office.

Resistance of various instars of mosquito larvae to pyrethrum oil emulsions.--Conspicuous differences in resistance by larvae of different instars to pyrethrum oil emulsion were shown by W. W. Yates, of the Portland, Oreg., laboratory. For example, an application of 15 gallons per acre of water surface gave a 100-percent kill on first-instar larvae, and a 98-percent kill on second-instar larvae; whereas 25 gallons of larvicide was necessary to obtain comparative kills of third- and fourth-instar larvae. Difference in resistance by species was again observed as evidenced by 35 gallons of larvicide, necessary to obtain a comparable kill of Culex and Theobaldia larvae.

Yellow electric globe as an insect-repellent lamp.--G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, have tested a yellow electric light globe, advertised as an insect-repellent lamp, in a light trap in comparison with a standard white light. Collections over a period of 8 nights in which the globes were interchanged, gave almost identical numbers of the 3 principal pest species with the 2 lights. The total volume of other insects taken was slightly greater with the yellow light.

Larvicidal control work with organic compounds.--W. V. King and R. C. Bushland, of the Orlando, Fla., laboratory, report that changes in the hydrogen-ion concentration of the water used as a diluent had a more or less marked effect on the larvicidal action of the compound tested. It also appeared, however, that this factor was not the only one responsible for the differences in mortality that occur in slightly acid distilled water, as compared with alkaline tap and certain natural waters.

Thallium acetate and thallium sulfate as fire ant baits.--Tests with these chemicals in northern Florida by B. V. Travis show that the best results were obtained with 1-percent baits applied in bait cans. In tests with 1-percent bait for all methods of application, thallium acetate destroyed 94 percent of 70 colonies, and thallous sulfate 88 percent of 80 colonies.

Life-history data on Clear Lake gnat.--A. W. Lindquist and C. C. Deonier report from Nice, Calif., that in the spring and early summer the larvae of Chaoborus were found to be more abundant in the upper 4 inches of bottom mud than during the fall and winter. During the fall, 61 percent of the larvae were in this layer, during March 84 percent, and during April to June 93 percent. It was also indicated that during May larvae in the lake required 18 days from egg to fourth instar.

Protection from fleeceworm and cutaneous myiasis infestations.--In preliminary tests E. F. Knipling, of the Menard, Tex., laboratory, reports that benzol containing 15 percent diphenylamine, diphenylene oxide, or p-nitrophenetole, has proved effective as a treatment for fleeceworm or cutaneous myiasis infestations caused by Phormia regina Meig. and Cochliomyia macellaria Fab.

FOREIGN PLANT QUARANTINES

Rice stem-borer in lily hamper.--While examining hampers of lily bulbs from Japan during May a New Orleans inspector noted that ends of some of the rice straws had been sealed. Examination revealed a live larva of *Chilo simplex* (Butler).

Psychology again stops fruitfly.--A second-class passenger from Puerto Rico was met at the New York pier on June 17 by his son. The son opened his father's baggage for the inspector while the father persistently kept behind the inspector. Following up this tip that the father had something to conceal the inspector found 13 mangoes on his person, 1 of them containing 3 live larvae of *Anastrepha* sp.

Customs help appreciated.--On June 17 Wilmon Newell, plant commissione of the State Plant Board of Florida, took occasion to express to Oscar Lounders, customs inspector stationed at Miami, Fla., his appreciation for customs personnel help in enforcing the Federal plant quarantines. The particular case in point was the finding of sweet-lime leaves hidden in the baggage of a passenger from Cuba. Upon examination, it was found that these leaves were heavily infested with the citrus blackfly, a destructive pest of citrus and other plants. This is merely one illustration of the type of cooperation which is and has been accorded by representatives of the Customs Bureau and the Post Office Department.

Entomological interceptions of interest.--Eight dead larvae of the Mexican fruitfly (*Anastrepha ludens* (Loew)) were found on June 9 in a mango in baggage at Del Rio, Tex., from Mexico. When the sack containing the mangoes was examined a living adult of *A. ludens* came out and was caught in the office on the window screen. A living larva of a lycaenid, identified as probably *Cosmolyce boeticus* (L.) was taken at New York on June 19 in green peas in stores from Portugal. Specimens of the curculionid *Pachnaeus litus* (Germ.) were found in a pineapple crate in cargo at Port Everglades, Fla., on May 25 from Cuba. Living larvae, pupae, and adults of the scolytid *Myelophilus minor* Htg. were taken at New York in pine wood used as packing for peat moss in cargo on June 13 from Holland. One living adult of the cerambycid *Anoplodera crassipes* Lec. was intercepted at Blaine, Wash., on June 10 on rose cuttings in cargo from England. Living adults of the bruchid *Callosobruchus analis* (F.) were found at Savannah, Ga., on May 27 in chick-peas in cargo from India. This bruchid is recorded by Maxwell Lefroy in "Indian Insect Life," 1909, as breeding in cowpeas in India. So far as is known, it does not occur in the United States. One living adult of the lygaeid *Ischnorhynchus ericae* Horv. was found at Mobile, Ala., on June 6, on cabbage in stores from Italy. The coccid *Asterolecanium stentae* Brain was taken on *Euphorbia* sp. in mail at Washington, D. C., on May 8 from the Union of South Africa. A living adult of the lygaeid *Sisamnes contractus* Dist. was intercepted at Laredo, Tex., on May 23, on pineapple in cargo from Mexico. One living adult of the ostomid *Temnochila metallica* Perch. was taken on pineapple at Brownsville, Tex., in cargo on June 15, from Mexico.

Pathological interceptions of interest.--Determinations received during the month included additional or belated determinations for several interceptions made in previous years but of interest because new to our interceptions files. Unless otherwise specified the interceptions were made at

New York. Determinations received included Apiosporella rhodophila Sacc. on manetti rose stocks from Ireland on January 1; Ascochyta buxina Sacc. on Buxus sempervirens from Germany on June 2, 1938; A. fabae Speg. on Vicia faba from France on May 9, 1938; Coryneum microstictum Berk. on manetti rose stocks from Ireland on January 29; Elsinoe australis Bitancourt & Jenkins on sweet orange from Brazil on March 24; Epicoccum nigrum Link on bell peppers from Mexico in May at Nogales; Fusicoccum microspermum Has. & Karst. form catappae Frag. & Cif. on green fruit of Terminalia catappa from Puerto Rico on January 1; Mycosphaerella citrullina (C. O. Smith) Gross. was intercepted from February to June, inclusive, on cucurbits from Cuba, hosts including chayote, cucumber, Momordica charantia, and crook-necked and hairy squashes, part of the determinations being verified by J. W. Wiant, of the Bureau of Plant Industry, by culturing; Peronospora pisi (deB.) Syd. on peas from Portugal on June 19; Pestalozzia compta Sacc. on manetti rose stocks from Ireland on January 29; Phragmidium rubi (Pers.) Wint. on Rubus sp. from France on October 28, 1936; Pleospora juglandis E. & E. on walnut scions from Poland on January 23, 1937; Septoria pisi West on peas from Portugal on June 19; Verticillium buxi Link on Buxus sempervirens from Germany on March 27, 1937.

DOMESTIC PLANT QUARANTINES

Plant-inspection work in District reorganized.--The Division of Domestic Plant Quarantines has recently taken over the work of inspecting plant shipments coming into Washington, D. C., to determine whether such shipments meet the plant-shipping regulations of the District of Columbia. This work will be conducted in connection with transit-inspection activities carried on by that Division for the enforcement of Domestic Plant Quarantines. Inspectors of the Division of Foreign Plant Quarantines will continue to inspect and certify plants to be shipped out of the District.

Grasshopper development.--Some flights of the lesser migratory hopper occurred in June in three counties of the contiguous area of Texas, Oklahoma, and Colorado and migrations also took place into adjacent counties of Kansas. The hatch of the lesser migratory hopper was completed in the infested areas of most of the States early in June and some adults were present in all States by the close of June. In many areas of the northern Great Plains States the cool weather continued in June and prolonged the hatch. In Maricopa County, Ariz., it has been reported that eggs laid in May hatched in June. Melanoplus mexicanus Sauss. appears to be the dominant species in almost all areas of North Dakota and Montana and in five counties of the Panhandles of Oklahoma and Texas. The heavy infestation of this species in north-central Montana this season constitutes a newly infested area, so far as extensive outbreaks are concerned, and is accounted for by reason of the heavy outbreak last year in eastern Montana and in western North Dakota and South Dakota, and the prolonged migrations in the general direction of this newly infested area. In northwestern Minnesota and contiguous area in North Dakota, M. mexicanus, M. bivittatus (Say), and M. packardii Scudd. developed beyond expectations because of dry weather and reached threatening proportions. The crop outlook in this area is poor. Infestations of M. mexicanus reported from six Colorado counties were reduced considerably by birds and weather conditions. M. bivittatus was the dominant species, with few exceptions, throughout South Dakota, northwestern Minnesota, northeastern Nebraska, and northeastern New Mexico. The development was similar to that of

M. mexicanus. Aeoloplus turnbullii (Thos.) was dominant in southwestern Nebraska and western Kansas and made localized flights from idle and range land into wheat fields in Trego County, Kans., late in June. M. devastator Scudd. remained the dominant species in California.

Grasshopper damage is light.--Crop damage thus far (July 1) in the region comprised by the 24 infested States has, as a whole, been light. Heavy vegetation along roadsides and in pasture lands afforded an abundant food supply. Drought in several States in June, however, caused increased migrations into crop areas.

Grasshopper outbreak in northern Montana controlled.--Most intensive baiting activities were conducted in June in the several counties of north-central Montana where infestations of the lesser migratory hopper seriously threatened the crops. Activity by farmers, combined with Bureau-paid labor, was responsible for reducing crop losses to not over 5 percent and preventing large-scale migrations. One hundred and seventy-two Government spreader units and 400 laborers were put to work. The peak of the infestation had passed by June 19. Grasshoppers were reduced from 500 to 10 per square yard in some areas. The farmers' attitude in this area has been highly favorable toward the bait-spreading program, and their cooperation nearly 100 percent. Across the line into Saskatchewan there lies an area of 2,400 square miles which is heavily infested with M. mexicanus. Some baiting is being done but a large part of the crop has been destroyed. On June 24 a few adult hoppers were observed milling in the air. This infestation, it is believed, has resulted from the 1939 flights out of eastern Montana and western North Dakota.

Infestations in eastern Montana and western North Dakota.--Populations of hoppers in this area have increased slightly but no damaging outbreaks have been reported. The situation on June 22 was described as "light to threatening, with spotty severe infestations and little damage to crops." In the strip-cropped areas, the idle strips were plowed or double disked. Most of such work was done by June 15 and nymphs of the first to third instars in these idle strips were almost completely eradicated.

Voluntary control in hopper areas.--Farmers and ranchers in parts of Montana, North Dakota, Minnesota, Arizona, and California made every effort to combat grasshoppers and the results they obtained were excellent. In the crop-hopper areas control was less effective. Heavy rains early in the season prevented extensive hopper damage and farmers were not inclined to bait until crop injury was apparent, in the hope that crops would mature and be harvested before being injured.

Bureau-paid control work in grasshopper areas.--Bureau-paid grasshopper-control operations have been carried on in the current season in the two regions--the Northern Great Plains and the Southern Great Plains--where infestations of the migratory species, combined with large areas of idle and range land, produced a situation with which the farmers in the lightly populated areas were unable to cope. To June 29, more than 1 million acres of infested lands, including roadsides, had been baited, in Bureau-paid operations, in Montana, North Dakota, South Dakota, Colorado, Oklahoma, New Mexico, and Texas The results have proved satisfactory in almost every instance. The average kill has been high. Two airplanes were brought into use for spreading bait in Baca County, Colo., four in Dallam County, Tex. By the close of June populations of the long-winged migratory hoppers in Colorado and New Mexico were so reduced that baiting was no longer justified and the work was discontinued.

Progress in Mormon cricket control.--Mormon cricket control work is well advanced and it seems apparent that crop protection will be almost complete in all areas. The operations were well organized in advance of the season and cricket bands were intercepted before they could invade the crops. Some migrations from higher elevations to crop lands took place, however, in western Idaho and Nevada. In Big Horn and Yellowstone Counties, Mont., where infestations were severe in former years, the large bands of crickets in the higher elevations fed on the abundant succulent native vegetation and few migrations to crop areas occurred. Half a million pounds of mixed dust has been spread this season on infested areas in Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. In addition to these dusting operations, baiting with sodium fluosilicate was conducted in three counties in Oregon and in experimental areas in Idaho, Montana, Wyoming, and South Dakota, with excellent results. In Jefferson County, Idaho, farmers in 1 week assisted in spreading more than 3,000 pounds of such bait to protect crops from a 6-mile-wide band of migrating crickets. Operations are conducted jointly with the States. Crews from C. C. C. camps of various Federal agencies, and laborers from the Indian Service have given substantial assistance.

Mormon cricket development.--Crickets reached adulthood in June in most of the infested States. In the higher elevations of two Wyoming counties cricket eggs had not yet hatched at the close of June. Two species of hymenopterous parasites were found to be infesting a rather high percentage of Mormon cricket eggs in that locality.

Baiting Mormon crickets proves highly successful.--The results of rather extensive tests in the use of fluosilicate bait for killing Mormon crickets have indicated that the use of bait from the fourth instar onward is probably more economical and satisfactory, particularly in areas other than cultivated fields, than is power dusting, although the latter method has proved effective in the control campaigns against this pest. In Madison County, Idaho, 160-200 acres was baited by hand by three men in approximately 3 hours and a kill of almost 100 percent was obtained. These results were brought about by strip-baiting in a half circle, applying the first strip of bait just within the vanguard of the band of migrating crickets. Very few crickets migrated beyond the baited strips. Hand-baiting in some instances has enabled two men to control crickets on acreage which would require the use of two power dusters. The results have been so good that this practice has been generally adopted on the work in Idaho this season. With crickets in the early instars, however, it is believed that it will be necessary to continue dusting when the weather is unsuited for baiting.

Peach-tree inspection.--Throughout the month of June cooperative Federal-State inspections have continued in the mosaic-infected States of Arizona, California, Colorado, New Mexico, Oklahoma, Texas, and Utah, and in the phony-infected States of Tennessee, Texas, Georgia, Arkansas, Alabama, Mississippi, Louisiana, Kentucky, Illinois, North Carolina, and South Carolina. Practically all inspections for the phony peach disease were concentrated on the nursery areas. Many previously infected properties and those adjacent thereto were also inspected at the time of the regular nursery inspection. Such phony-peach-inspection work was completed by June 30 in all nurseries and their environs, with 2 Georgia nurseries involving approximately 6,000 peach nursery trees, and 1 Texas nursery involving 5,000 peach trees, failing to meet the phony peach certification requirements. In the results of the mosaic inspections, it is necessary to supplement the item on peach-tree inspection in the July 1, 1940, News Letter (v. VII, No. 7, pp. 27-28), with the statement that 2 nurseries in New Mexico, as well as several small nurseries in Colorado producing stock for home use only, failed to meet the certification requirements of the standard State quarantines.

Progress in chinch bug control.--At a conference, attended by B. M. Gaddis and C. M. Packard, on the chinch bug situation held at Chicago on June 16 with State leaders of four heaviest infested States, orders were placed for the required quantities of creosote, of which 100 cars were rolling the next day. Throughout the month all requests for creosote were filled as rapidly as received. The facilities provided were capable of placing, loading, billing, and rolling a million gallons on the day the orders were received. To the close of June, there were shipped to Illinois, Iowa, Kansas, Missouri, and Nebraska 905,000 gallons of barrier oil. Federal scouts continued to make surveys in cooperation with the affected States and kept the Washington and Chicago offices informed of the current situation. Spotted heavy rains over most of the heavily infested area during the last week in June somewhat reduced the seriousness of the problem. However, in the area comprised of northwestern Missouri, southwestern Iowa, and northeastern Kansas the rains were not sufficient to materially reduce chinch bug development in the most heavily infested sections. The situation remained serious and general migrations were expected to continue in the early part of July.

New infestations of white-fringed beetle.--New infestations of the white-fringed beetle were found in June in the vicinity of Mobile, Ala., New Orleans and Baton Rouge, La., and Laurel, Miss. These properties are, however, in the general location of areas formerly known to be infested. The infestation at Mobile, found on both banks of Three-Mile Creek, adds over 200 acres to the known infested area. Few beetles have been found, however on the old infested area in the vicinity of Mobile, where intensive eradication measures have been carried on for several months. At Laurel, Miss., three adult beetles were picked up on the highway in a new locality and highway inspection south of the New Orleans control area was also the means of locating two of the four new infestations there. At Baton Rouge one beetle was picked up on a property adjoining a formerly infested nursery. Immediate suppressive action is being taken in all these infested localities. In the Mobile area as many as six applications of herbicide and three of calcium arsenate spray have been made, while in the old infested area localities suspected of harboring any beetle eggs are burned.

White-fringed beetle control.--Throughout the infested areas the work of disking and fallowing the fields went forward, and dusts and sprays were applied again and again on the known infested properties, in some instances as many as 10 times. W. P. A. laborers are employed on the work. Night dusting is proving satisfactory in certain Alabama areas. It is found that more work can be accomplished under this schedule with the limited power-dusting equipment available. Frequent heavy rains throughout the infested areas of the various States have greatly retarded the control work. Repeated applications of dust have been made between rains, however, and equipment, materials, and personnel are in readiness for further broad-scale operations. The work is being carried forward jointly with the affected States. With the resumption of seasonal quarantine restrictions there has been increased activity in regulatory work and increased movement of scrap metal is reported.

Wild-host plants of sweetpotato weevil inspected.--In June inspectors on the Federal-State cooperative sweetpotato weevil control and eradication project conducted rather extensive inspections of wild-host plants, principally the "Indian potato," on infested properties or those adjacent thereto in the States of Alabama, Georgia, Mississippi, and Texas. The results were negative, except for the finding of 1 dead weevil 50 yards from a formerly infested storage bank. Traps operated during the month caught 1 weevil in Baldwin County, Ala., but none in the areas in Georgia in which the traps were set. Control, eradication, and regulatory work was conducted during the month. In Mississippi inspection and other activities went forward in 12 counties. In Texas the work was centered on the buffer area, and all plant beds in a 5-mile strip across the southern part of Nacogdoches County, bordering the area from which weevils have recently been eradicated, were inspected without finding any of these pests.

New regional district in transit inspection.--N. H. Dunlap has been placed in charge of transit inspection in the southern region of the United States, with headquarters at Washington, D. C. This newly formed region includes the transit-inspection stations of Atlanta, Birmingham, Memphis, and Dallas, and cooperative Federal-State inspection at Jacksonville. Inspection at Washington is also being conducted under this set-up for enforcement of plant shipping regulations of the District of Columbia, insofar as such inspection applies to incoming shipments. Transit-inspection activities were temporarily suspended at Birmingham on June 25, at Memphis on June 15, and at Dallas on April 15. These three stations have proved to be important as inspection points for the enforcement of Federal domestic plant quarantines.

Fruits, vegetables, and cut flowers inspected in transit.--Transit-inspection activities throughout the various regions, including those of the Central States, are given over largely to the enforcement of the Japanese beetle quarantine regulations, through the inspection of fruits, vegetables, and cut flowers shipped from the area heavily infested with the beetles and checking the screening of such produce in transit. Farm produce from the white-fringed beetle regulated areas is also being inspected at Chicago and other transit-inspection points.

Air shipments inspected.--Two plant shipments from the gypsy moth area which had been consigned by air without moth certificates were caught by transit inspectors in June. One containing cedar cuttings in a bouquet of cut flowers was intercepted at Boston and the other containing field-grown cut roses was caught at Pittsburgh. With the opening of a new airport at Philadelphia on June 20, a survey of the daily movement of planes was made by a transit inspector who reports there are 80 arrivals and departures daily. In New York City the inspection of air express, which since last October has been limited, was resumed on a larger scale in June, in order to effect a more complete coverage of cut-flower consignments.

Inspection of citrus in the lower Rio Grande Valley.--At a recent conference with Texas State plant-pest-control officials, it was the decision to transfer tree-removal work under the citrus canker project from the Houston area to the commercial area in the lower Rio Grande Valley. Work in the former section has progressed to a point where few large *Citrus trifoliata* trees remain therein. In the valley area during May and June over 17,000 old and abandoned citrus trees were removed with the assistance of 58 W. P. A. laborers. A county-owned tractor has been loaned to help in pulling out large plantings of citrus trees in this district. One hundred and thirty properties, including several on which canker had been found many years ago, were inspected without finding the disease. From 5 to 7 Bureau inspectors and 1 State man made the inspection. No citrus canker has been found in the lower Rio Grande Valley in the last 18 years.

CONTROL INVESTIGATIONS

Effects of poison administration on blood cells of southern armyworm.--At the Beltsville, Md., laboratory, J. Franklin Yeager and Sam C. Munson have studied the effects upon blood cells of *Prodenia eridania* Cram. of feeding large doses of a number of poisons to sixth-instar larvae. Nicotine bentonite, nicotine peat, rotenone, pyrethrum, and phenothiazine produced no marked changes, but marked changes in the blood cells did follow the administration of calcium arsenite, calcium arsenate, arsenic trioxide, paris green, lead arsenate, sodium fluoride, sodium fluoaluminate, barium fluosilicate, and mercuric chloride. The cells appeared unaffected upon prolonged (6 hours) exposure of the larvae at room temperature to air saturated with nicotine vapor. The larvae were fed the poisons after having been fed glucose to increase blood-cell glycogen and after having been ligatured in such a way that the fore ends only would be affected by ingested poisons and the hind ends could be used as controls. The arsenicals, the fluorides, and mercuric chloride caused blood cell changes of both a physiological and a degenerative or toxicological nature. The physiological changes consisted of alterations of cellular form (passive-active transformations) and an increase of cellular agglutination *in vivo*. The degenerative changes consisted of marked cellular agglutination, cellular distortion, cellular disintegration, and apparent loss of cells from the circulating blood. Cellular degeneration involved apparent swelling, disruption, and decrease in visibility of cytoplasmic structure, decreased staining ability, decrease and loss of cellular glycogen, formation of cytoplasmic bulges, formation of and liberation of cytoplasmic plastids, excessive vacuolization, cellular raggedness, nuclear distortion, nuclear fragmentation, nuclear condensation, and occasionally nuclear extrusion.

INSECTICIDE INVESTIGATIONS

A new method for quantitative determination of pyrethrins.--A method has been developed by F. B. LaForge and F. Acree, Jr., for the determination of pyrethrins I and II, based on the previously observed property of the pyrethrins to undergo cleavage on hydrogenation with formation of dihydro chrysanthemum monocarboxylic acid and chrysanthemum dicarboxylic acid monomethyl ester, a reaction that has since proved to be quantitative and specific. The acid reaction products are separated by steam distillation, the one being volatile (and stable), the other practically nonvolatile. The pyrethrins are calculated from the respective titration values. The process involves the hydrogenation in ethanol or acetone solution of pyrethrum concentrates, oleoresins, or extracts of flowers, precipitation of fatty acids by aqueous barium hydroxide, filtration, acidification of filtrate, separation of acids by steam distillation, direct titration of distillate and titration of non-volatile acids after extraction with ether or other solvent. The method has been tested on a number of samples with very precise results. As compared with other standard methods, the values obtained are slightly higher. The hydrogenation method has the decided advantage over others in that the results for both pyrethrins are obtained in about 1 hour, exclusive of the extraction process where the determination is made on flowers or powders. A detailed publication will follow shortly.

An analytical method for determining nitrogen.--In practically all cases of chemical investigation the final solution of a problem resolves itself into one of analytical procedure. In other words, the purity, composition, or nature of a substance must be determined by analysis. One element which must frequently be determined is nitrogen. There are many ways this may be done and there is also much misunderstanding as to the simplest and best way of doing it. E. P. Clark, in collaboration with the Association of the Official Agricultural Chemists, has made an exhaustive study of this problem and has developed a simple, rapid, and extremely accurate procedure for the determination of nitrogen in practically all types of nitrogenous compounds. This method is to be presented to the A.O.A.C. at their annual meeting in the fall and it is almost certain that it will be adopted as official by that body. The method will thus have a legal as well as a scientific status.

Phenothiazine interference case.--On April 29, 1940, the United States Court of Customs and Patent Appeals reversed the decision of the Board of Appeals of the United States Patent Office in Interference No. 71,407, Floyd E. Smith, appellant, of the Division of Insecticide Investigations, vs. Euclid W. Bousquet, appellee of E. I. du Pont de Nemours & Co., and thus awarded priority of invention in the matter of the use of phenothiazine as an insecticide to Mr. Smith. Mr. Smith filed an application for a patent on the use of phenothiazine as an insecticide on June 9, 1934, and Bousquet filed a similar application on July 26, 1934. The Examiner of Interferences and the Board of Appeals of the Patent Office both awarded priority to Bousquet. The Office of the Solicitor on July 16, 1940, advised this Bureau that the United States Court of Customs and Patent Appeals on June 21, 1940, denied the petition of appellee Bousquet for rehearing in Patent Interference 71,407. The decision of the United States Court of Customs and Patent Appeals, the final tribunal in patent interference cases, is of interest to workers with insecticides because, in the opinion of this Court, an invention concerning the insecticidal use of any material is not reduced to practice until it has been tested under conditions under which the insect is naturally found.

BEE CULTURE

Parasites help preserve pollen samples.--Frank E. Todd, Davis, Calif., reports: "Pollen samples, waiting to be or stored in the laboratory have been seriously infested by the Indian-meal moth (Plodia interpunctella Hbn.) and have required constant attention. During the adjustment period, owing to changes in regulations concerning the hiring of temporary help, pollen samples were left exposed for longer periods before storage. Notwithstanding this, adult meal moths rather suddenly practically disappeared, and in their stead numerous parasitic Hymenoptera (not yet identified but similar in appearance to descriptions of Microbracon hebetor Say) appeared. Needless to say, this assistance is very much appreciated."

Variations in the technique of artificial insemination of queen bees.--Otto Mackensen, University, La., reports the use of transmitted light to determine the comparative number of spermatozoa in spermathecae of queens inseminated by various methods. In these comparisons the spermathecae transmitting the least light are considered to contain the most spermatozoa. Some preliminary results are as follows: The greater the volume of sperm injected at a single operation, up to the capacity of the queen's oviducts, the more spermatozoa reach the spermatheca. When the vagina was filled with the mucus secretion of the drone, after the sperm was injected, distinctly better results were obtained than when no mucus was used. A smear of mucus over the opening of the vagina was less effective. When the sperm was taken from the seminal vesicles of the drone slightly better results were obtained than when the drone was ejaculated and the sperm taken from the everted penis. Drones which had been kept in a constant temperature cabinet at low humidity from the time they emerged until used were found to be as satisfactory as drones returning from flight.

Queens shipped by mail start egg laying later than those shipped in standard packages.--C. L. Farrar, Madison, Wis., reports that of 139 queens 42.44 percent required from 2 to 6 days to begin egg laying. These were a part of 267 queens received by mail and introduced into queenless packages. The time of observation did not permit an estimate of the initial egg laying for 98 queens. Two were virgin queens, 27 were lost at introduction, and 1 was dead before introduction. Out of the 139 queens, approximately 21 percent required 2 days to begin laying; 10 percent, 3 days; 2 percent, 4 days; 3 percent, 5 days; and 6 percent, 6 days. More than 95 percent of the queens in standard packages introduced by the spray and direct-release method during the last 3 seasons began laying in less than 1 day, averaging 12 to 18 hours. The delayed egg laying of queens shipped by mail for use in packages coincides closely with that when queens shipped by mail have been sprayed directly into established colonies. Introduction losses are higher and more time is required for the queens to lay. Delayed egg laying may be directly responsible for the loss of some queens. It may be assumed that queens shipped by mail are not properly fed by the small number of attendant worker bees to keep their reproductive organs in active condition. In standard packages, from 7,000 to 10,000 worker bees which have been feeding brood are available to provide the queen with royal jelly. As approximately 22 percent of this year's queens began laying in less than 1 day, it may also be assumed that some of the attendant bees were in better condition to feed these queens. Some experimental evidence has indicated that queens held in mailing cages, provisioned with candy containing pollen, began laying sooner than in those lacking pollen. Worker bees require pollen in order to secrete royal jelly.

Cooperative investigation on losses of adult bees in Utah.--In Utah the severe losses of adult bees that have occurred in recent years have been ascribed to various causes, such as insecticidal spraying and dusting operations, grasshopper-control methods, and the effect of smelter fumes.

Consequently field work was started this spring on a cooperative project, between the Bureau of Entomology and Plant Quarantine and the Utah Agricultural Experiment Station, to investigate the extent and causes of losses of adult honeybees in the State of Utah and other sections of the country where insect-control programs are in progress. This project is under the direction of A. P. Sturtevant, Laramie, Wyo. Work in the field is being done by John D. Hitchcock, of the same laboratory, and Geo. H. Vansell, of Davis, Calif., working in cooperation with Geo. F. Knowlton, research associate professor of entomology of the Utah Agricultural Experiment Station and State leader of grasshopper and mormon cricket control. Samples of bees from affected areas are being collected and sent to the Laramie, Wyo., laboratory for arsenical analyses and examinations for intestinal parasites. The attractiveness to bees of grasshopper baits of various kinds is being tested and the possible role of poisonous plants is also being investigated. Dr. Sturtevant reports that in the work thus far, "With the exception of possibly two apiaries, no serious losses of bees have been observed this summer up to the end of June, although a number of beekeepers feel that the death rate is already excessive in their yards, and are alert to notice dead bees in front of their hives. Samples of bees from one of the above-mentioned exceptions were found to contain from 0.00027 to 0.00030 mg. of As_2O_3 per bee, while the other showed only 0.00016 mg. per bee, not large amounts. The results from 82 samples of bees that so far have been analyzed at the Laramie laboratory may be summarized as follows: 41 samples of apparently normal bees concerning which there was no particular suspicion averaged 0.00012 mg. of As_2O_3 per bee, ranging between 0.00004 and 0.00020 mg. per bee, with the exception of 1 showing 0.00026 and another 0.00032 mg. per bee; 33 samples from places where there were presumably heavy losses last year, or where bees have been dying this year with more or less suspicion of possible contact with poison, averaged 0.00024 mg. of As_2O_3 per bee, ranging from 0.00008 to 0.00039 mg. per bee. Eight samples of bees have been analyzed taken from experimental colonies at the Experiment Station at Logan, where grasshopper bait experiments have been carried on, showing 7 samples ranging between 0.00010 and 0.00026 mg. of As_2O_3, and one which showed 0.00073 mg. As_2O_3 per bee, the highest amount that has been found in any sample so far. The exact history of this sample is not known at this writing. Five samples of pollen have been analyzed, 1 taken from combs in an apiary showing no arsenic, and 4 taken from pollen traps ranging from 0.00004 to 0.00011 mg. of As_2O_3 per gram of pollen. Samples of normal bees from colonies at Laramie ranged between 0.00001 and 0.00004 mg. of As_2O_3 per bee, much lower than the apparently normal bees from Utah, only 4 out of the 41 samples showing as low as 0.00004 mg. per bee. Up to the present it is felt that no significant results have been obtained. The difference between apparently normal bees and those for which there might be a possible but not very definite suspicion is hardly sufficient to be important, with the variations within these groups so great. No evidence of intestinal parasites has been found. Two samples of *Astragalus utahensis* and two of *Astragalus cibarius* (Sheldon) common in the neighborhood of some of the beekeeping areas being investigated have been analyzed for the presence of selenium by the Chemistry Department of the Wyoming Agricultural Experiment Station and no selenium has been found."

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IDENTIFICATION AND CLASSIFICATION OF INSECTS

Receipt of Chilean earwig injurious to potato.--Among the insects recently collected in Chile by P. A. Berry, of the Division of Foreign Parasite Introduction, are two specimens of *Esphalmenus lativentris* (Philippi). These earwigs were found at Castro, Chile, feeding on the surface of a tuber in a potato-storage warehouse. They are the first specimens of the genus *Esphalmenus* to be received for the National Museum collections. Species of *Esphalmenus* are wingless and resemble somewhat the common genus *Euborellia*, though the two genera belong to different subfamilies. There are several species, all of which occur in the Andean and extreme southern regions of South America, except one which lives in South Africa. Chile is well known as the home of many insects, as well as of plants, which have few close relatives elsewhere in America, and many of which show affinities with Australian, New Zealand, or South African species. A case parallel to the present one is that of an orthopteran, *Cylindroryctes spegazzinii* (G.-T.), described from the sandy shores of Lake Nahuel.Haupi near the Chile-Argentine boundary. In 1927 R. C. Shannon obtained specimens of this peculiar insect, which he gave to the National Museum, near the type locality. The species looks like a very elongate mole cricket, and according to farmers of that region it often causes injury to potatoes and other vegetables. The only close relatives of *Cylindroryctes* are species of *Cylindracheta*, which inhabit Australia, New Guinea, and other islands of the Australasian region.

Valuable series of psocids collected in peach-insect survey.--During the last 3 years and more, L. D. Christenson, W. F. Turner, and their co-workers engaged in a survey of insects found in peach orchards have submitted many psocids of unusual interest. Only one thoroughly modern revisionary paper has been published in the United States on the Corrodentia, and the opportunities to contribute important distribution records and discover rare or new species are good. Many species live among dead leaves and other ground litter, so that the methods employed by the peach-insect collectors in examining the surface cover of orchards have been fruitful. Material in the genus *Lachesilla*, which genus contains the cosmopolitan *L. pedicularia* (L.), often intercepted in commerce, has been especially well represented among the collections received and it is hoped that revisionary studies will eventually be made.

Correction of record concerning a Chinese scale insect.--The infestation of a new scale insect, *Parlatoria chinensis* Marlatt, reported in the News Letter dated June 1, 1940 (v. VII, No. 6, p. 35), as having been found at Glendale, Mo., occurred instead near Tower Grove Park, in the central part of St. Louis.

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